

SCIENCE

The Main Book

By A Group of Supervisors

Contents

THEME ONE : Systems

UNIT ONE : **Living Systems**

THEME TWO : Matter and Energy

UNIT TWO : **Motion**

Theme One : Systems

UNIT 1 Living Systems



Get Started

What I Already Know

- **There are many factors that affect the life of living organisms in their environments such as :**
  - Hot and cold temperature.
  - Amount of water.
  - Availability of food.
  - Availability of shelter.
- **Overtime, animals and plants adapt or change according to the previous factors, so that they can live, eat, breathe, stay safe and so on.**

Examples :

- Camel's body is covered with a special thick hairy skin to protect it from the hot weather in desert.



Camel

- Palm trees have strong roots to fix them in the soil against strong winds in desert.

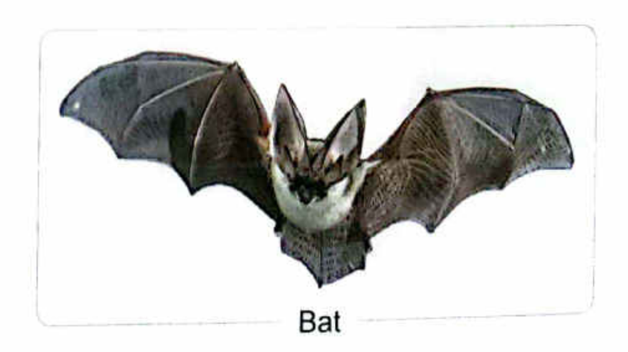


Palm tree

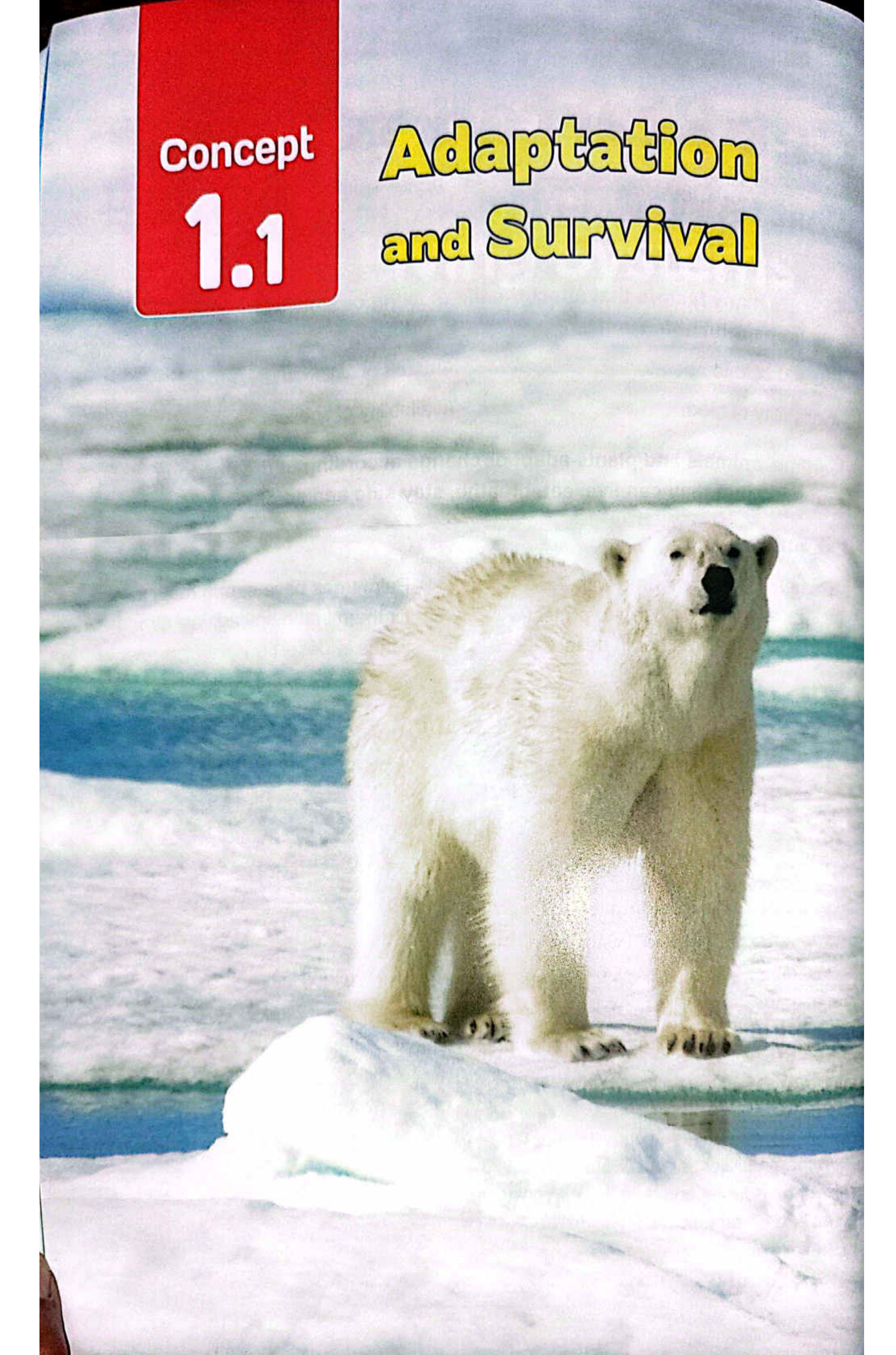
- **In this unit, you are going to study :**
  - Types of adaptations of living organisms.
  - How humans and animals use their senses to gather (collect) information.
  - Adaptations of some animals that are active at night.
  - How humans and animals communicate and transfer information.

- **Unit Project : "Bat Chat"**

At the end of this unit, you will make a research project about "Bats" to learn how their adaptations help them to navigate, hunt and communicate.

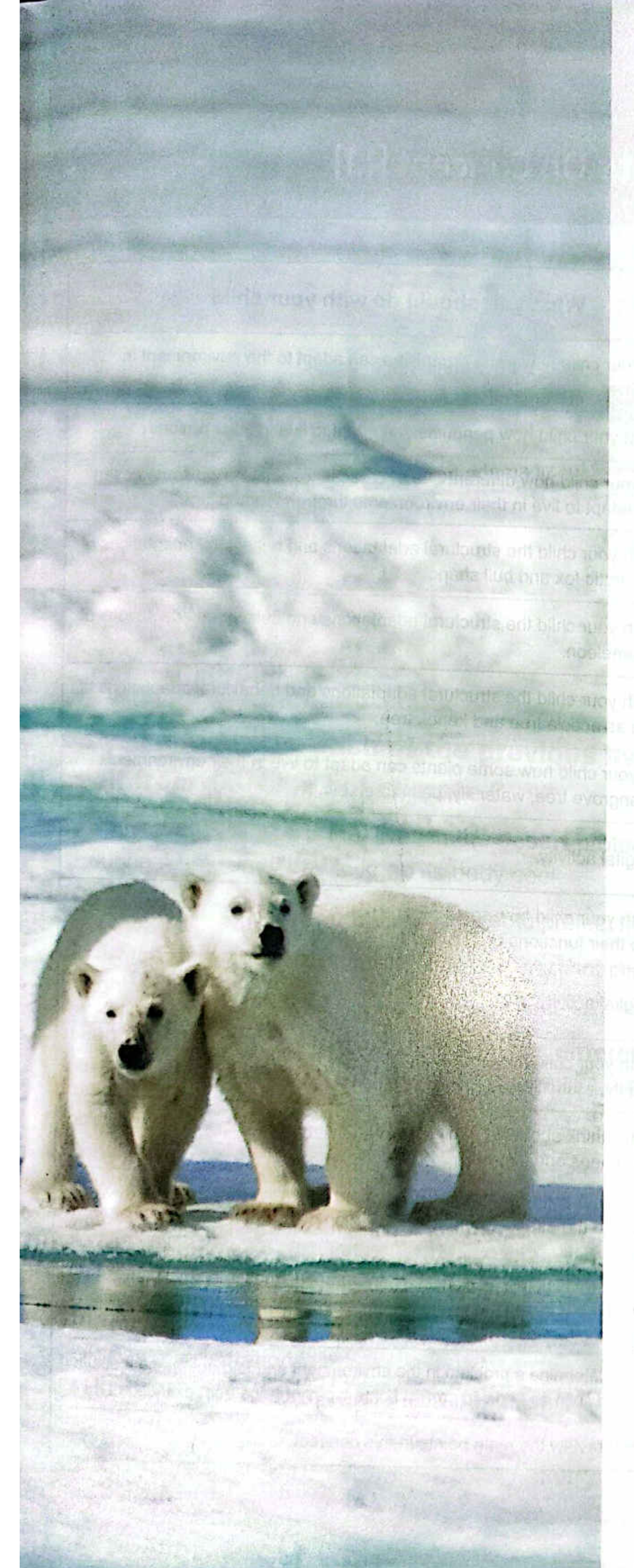


Bat



Concept 1.1

Adaptation and Survival



Learning outcomes

By the end of this concept, your child will be able to :

- Model the relationships among an organism's survival, habitat, adaptations and body systems.
- Argue from evidence that plants and animals have structures and behaviors that help them survive and grow.
- Explain how structural adaptations help organisms survive in specific environments.
- Argue from evidence that multiple adaptations or organs work together in systems to help organisms survive in specific habitats.

Key vocabulary

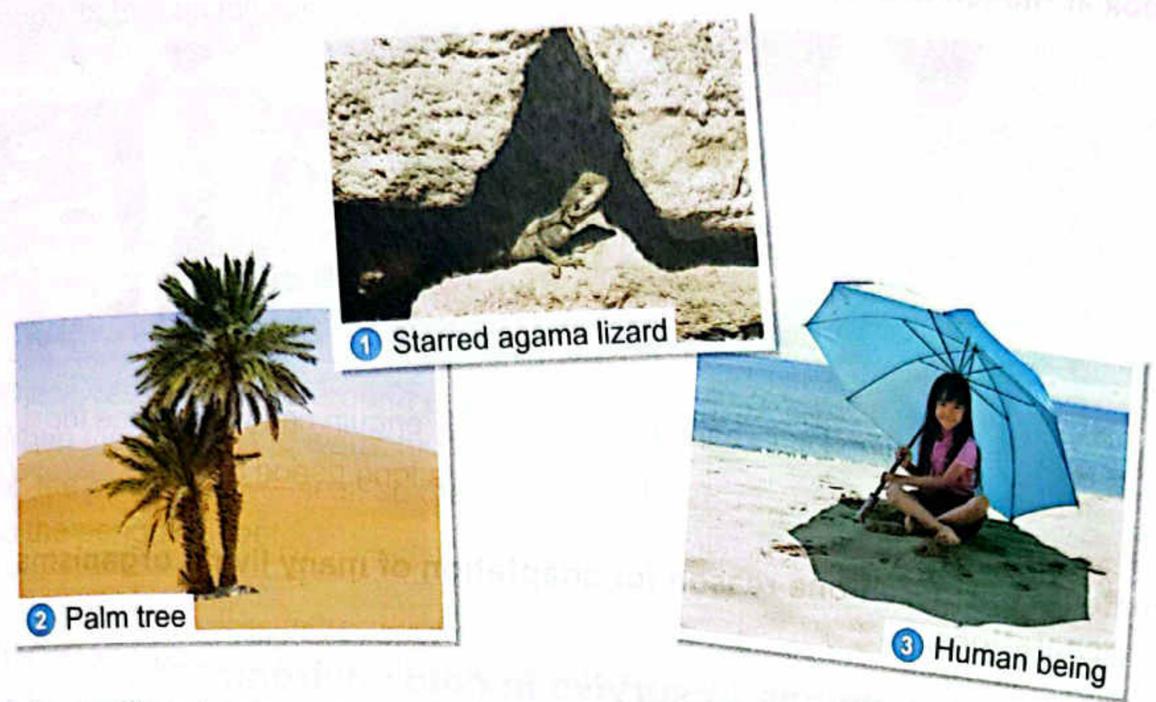
- Adaptation
- Arctic
- Camouflage
- Digestive system
- Ecosystem
- Energy
- Extinct
- Ocean
- Organism
- Pollute
- Predator
- Prey
- Reproduce
- Survive
- Respiratory system

Notes For Parents On Concept [1.1]

Lessons	Activities	What you should do with your child
1	Activity 1	Explain to your child how living organisms can adapt to the environment in which they live.
	Activity 2	Discuss with your child how penguins can adapt to live in polar regions.
	Activity 3	Explain to your child how different bears, caracal, fennec fox and some desert lizards can adapt to live in their environments through "camouflage".
2	Activity 4	Discuss with your child the structural adaptations and behavioral adaptations of fennec fox, arctic fox and bull shark.
	Activity 5	Discuss with your child the structural adaptations and behavioral adaptations of panther chameleon.
3	Activity 6	Discuss with your child the structural adaptations and behavioral adaptations of plants such as acacia tree and kapok tree.
	Activity 7	Explain to your child how some plants can adapt to live in their environments such as mangrove tree, water lily, palm tree...etc.
	Activity 8	Optional digital activity.
4	Activity 9	Discuss with your child how some organs of the human digestive system can adapt to do their functions to help the human body survive.
	Activity 10	Optional digital activity.
	Activity 11	Discuss with your child how some organs of the human respiratory system can adapt to do their functions to help the human body survive.
5	Activity 12	Let your child think about the similarities and differences between the respiratory system of humans and fish.
	Activity 13	Discuss with your child some of the ecosystem changes that are caused by the nature and also the effect of human activities on plants, animals and humans themselves.
	Activity 14	Help your child to think like a scientist by answering a question about one of the main points of this concept then write his/her claim, evidence and the scientific explanation.
6	Activity 15	Let your child determine a problem in the environment and find out the best solution for this problem such as : how to protect some types of frogs from extinction.
	Activity 16	Let your child review the main points in this concept.

LESSON 1

Activity 1 Can You Explain ?


1 Starred agama lizard
2 Palm tree
3 Human being

Do you notice how each of the previous living organisms protect itself from extreme hot climate ?

1. **Starred agama lizard** that lives in the **desert** protects itself by finding shaded area during a hot sunny day to keep its body cool.
2. **Palm leaves** are covered with waxy layer to protect them from extreme hot climate.
3. **Human being** protects himself from extreme hot climate by using umbrella and light clothes.

▸ **Each of the previous living organisms has different ways to protect itself from extreme hot climate, and these different ways are known as " Adaptations ".**

Adaptations :

They are characteristics that help living organisms to survive and reproduce in the ecosystem in which they live.

- Adaptations occur over many generations.

Note

Ecosystem is an area in which living and nonliving things interact with each other.

▸ **In this concept, we will study :**

- Types of adaptations.
- Human's body systems and their adaptations.
- Plant adaptations.

agama lizard	سحلية العجمة	hot climate	المناخ الحار	characteristics	صفات
shade area	منطقة الظل	adaptation	تكيف	ecosystem	نظام بيئي
waxy layer	طبقة شمعية	survive	يبقى حيًا	interact	يتفاعل
extreme	شديد	reproduce	يتكاثر	generations	أجيال

Activity 2 Penguin Feet

▶ **Look at the following pictures, then put (✓) or (×) :**





1. You can stand on ice in barefeet for about 5 minutes. ( )
2. Penguin can walk on ice for a long period of time. ( )

Climate is considered one reason for adaptation of many living organisms over generations.

Adaptation of penguins to survive in cold environment :

Unlike most birds, penguins cannot fly but they can stand on ice all day.

- **Habitat :**

Penguin in Antarctica lives in a polar climate that is one of the coldest places on the Earth.

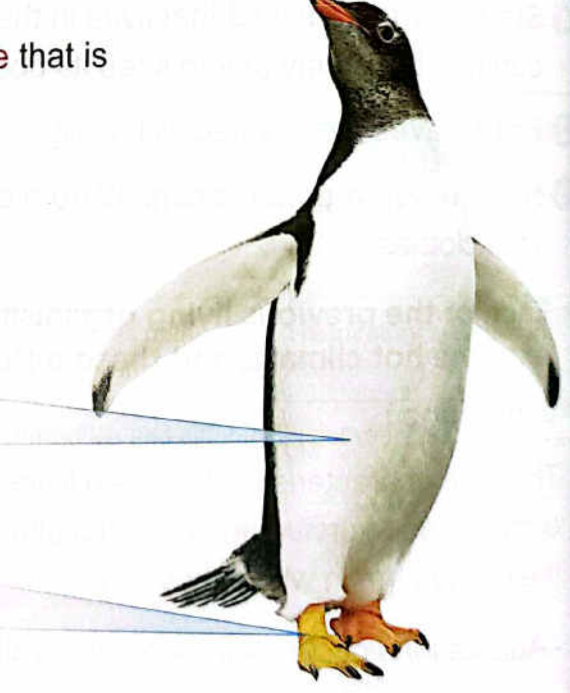
- **Adaptation :**

Its body :

Penguin's body is covered with dense feathers and a thick layer of fat **to keep its body warm.**

Its feet :

Penguin's feet have no feathers.



Penguin



Note

Habitat is the environment where living organisms live in.

barefeet	حافي القدمين	penguin	بطريق	habitat	موطن
Antarctica	القارة القطبية الجنوبية	polar climate	المناخ القطبي	environment	البيئة
dense feathers	ريش كثيف	warm	دافئ		

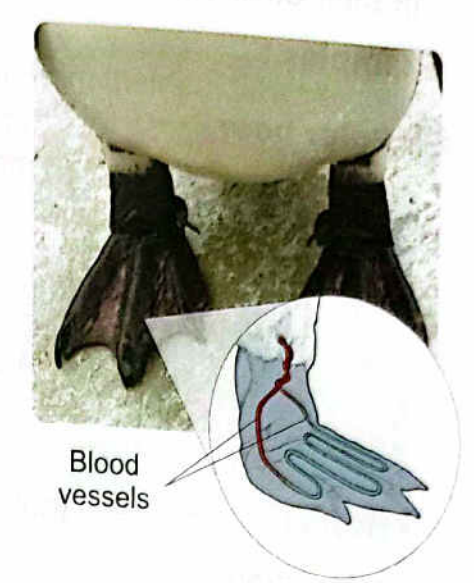
How do the penguin's feet stay warm ?

The penguin's feet stay warm due to the way of moving the blood in blood vessels through its feet as follows :

1. Blood vessels bring cold blood up from the feet.

2. Other blood vessels bring warm blood down to the feet from the feather-coated body.

3. These vessels weave around each other. When they touch, the warm blood vessels heat up the cold blood vessels, so the heat transfers to the penguin's feet.



- **This means that the blood moving up into the penguin's body is not cold and the blood moving down to the penguin's toes is warm enough to keep its toes from freezing.**



Give reason for ...

Penguins' feet help them survive in cold climate.

Because blood vessels that carry warm blood from the body weave around the blood vessels that carry cold blood from the feet. This leads to warming the blood vessels of the penguin's feet to survive in cold climate.



Check your under...

▸ Put (✓) or (✗) :

1. The blood vessels coming upwards from the penguin's feet carry warm blood. ( )
2. Penguins can adapt to live in extreme cold environment by having feathers and fat in their feet. ( )

blood vessels	أوعية دموية	toes	أصابع الأرجل
freezing	تجمد	enough	كافى
weave	نسج	adapt	يتكيف

Activity 3 Adaptations for Survival

▸ Some animals have some adaptations that help them survive and reproduce in their different environments.

Examples :



1 Polar bear



Polar bear

- **Habitat :** Arctic region (polar region).
- **Adaptation :**

  It has white and thick fur :

  - **Its white fur** helps it blend in with the snow as it sneaks up on its prey.
  - **Its thick fur** helps it stay warm in its cold arctic region.

2 Brown bear and black bear



Brown bear



Black bear

- **Habitat :** Forests.
- **Adaptation :**

  They have dark fur to help them hide among the trees when they hunt.

3 Caracal and fennec fox



Caracal

Fennec fox

- **Habitat :** Desert
- **Adaptation :**

  They have sandy-colored fur (tan-colored fur) to help them blend in with desert landscapes.

4 Some desert lizards



Desert lizard

- **Habitat :** Desert
- **Adaptation :**

  They have colorful scales that make them hide among the colorful rocks in the desert.

arctic region	منطقة القطب الشمالي	forests	الغابات	fennec fox	علب الفنك
blend	يندمج	hunt	يصطاد	scales	راشيف
caracal	القط البري	sneak up	يتسلل	hide	خفي
landscapes	المناظر الطبيعية				

• **From the previous examples, we notice that some animals adapt in many ways to hide from their predators or their preys by a way of adaptation called "camouflage".**

Camouflage :

It is a type of adaptation that some animals use to hide from their predators or their preys by blending in with the surrounding environments.

Notes

1. Predator is an animal that hunts and eats another animal.
2. Prey is an animal that is hunted and eaten by another animal.



Check your understanding

▸ Put (✓) or (✗) :

1. Polar bear has a dark fur to blend in with the snow. ( )
2. Brown bear lives in arctic region, while polar bear lives in forest. ( )

▸ Complete the following statements :

1. Fennec fox has .... fur to help it blend in with desert landscapes.
2. The type of adaptation that some animals use to hide from their predators or their preys is known as ....

In the Assessment Book :
Try to answer :
Self-Assessment (1)

predator مفترس
prey فريسة
camouflage التمويه / التخفي
surrounding environments البيئات المحيطة

Exercises on Lesson 1

● Understand ● Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

1. Adaptation helps the living organism in all the following characters except ....
   a. surviving. b. reproduction.
   c. hiding. d. death.
   (Cairo 2022)
2. The starred agama keeps cool during a hot sunny day in desert by ....
   a. eating green vegetables. b. drinking more water.
   c. secreting more sweat. d. finding a shaded area.
3. If you catch a piece of ice in your hand, you will begin to lose feeling in your fingers after a few ....
   a. minutes. b. hours.
   c. days. d. weeks.
4. Penguins live in a polar climate which ....
   a. is one of the hottest places on Earth.
   b. is one of the coldest places on Earth.
   c. looks like the desert climate.
   d. looks like the forest climate.
5. Which of the following ways help penguins to adapt to live in polar climate ? ....
   a. Their bodies are covered with skin.
   b. Their bodies are covered with dense feathers only.
   c. Their bodies are covered with a thick layer of fat only.
   d. Their bodies are covered with dense feathers and a thick layer of fat.
6. In penguin's feet, ...
   a. warm blood vessels weave around cold blood vessels.
   b. warm blood vessels weave around its toes.
   c. cold blood vessels weave around its toes.
   d. cold blood vessels weave around dense feathers.
7. Penguin's feet have blood vessels that bring .... up from its feet towards its body.
   a. cold water b. warm water c. cold blood d. warm blood
8. The presence of a thick white fur is an adaptation in ....
   a. starred agama lizard. b. polar bear.
   c. fennec fox. d. forest bear.

9. Bears that live in forests have fur .... that of polar bears.
   a. whiter than
   b. darker than
   c. similar to
   d. brighter than
10. Fennec fox and caracal have.......... that help them blend in with desert landscapes.
   a. colorful scales
   b. thick white fur
   c. sandy-colored feathers
   d. sandy-colored fur
11. Desert lizards have .... that make them hide among the colorful rocks in the desert.
   a. tan-colored fur
   b. colored scales
   c. sandy colored feathers
   d. dark fur
12. Camouflage means that the animal ....
   a. can be seen easily among its surrounding environment.
   b. is hard to be seen among its surrounding environment.
   c. is easily to be seen by its preys.
   d. can be seen easily by its predators.
13. Which of the following birds is more difficult to be seen by its predator ?..........
   a. A red bird on a green tree.
   b. A blue bird on a green tree.
   c. A yellow bird on a green tree.
   d. A green bird on a green tree.

2 Choose from columns (B) and (C) what suit them in column (A) :

(A) Animal	(B) Adaptation	(C) Helps it to ...
1. Penguin	a. has dark fur	A. stay warm and hide from preys
2. Caracal	b. has thick white fur	B. keep its body warm
3. Brown bear	c. has thick layer of fat and dense feathers	C. blend in with desert landscapes
4. Polar bear	d. has sandy-colored fur	D. hide among the trees when it hunts

1. ...... → ...... 2. ...... → ...... 3. ...... → ...... 4. ...... → ......

3 Put (✓) or (✗) :

1. The desert lizard blend in with large green trees, to hide from its enemies. (   )
2. Animals that live in hot deserts have special ways to keep their bodies cool during hot sunny days. (   )
3. Living organisms can survive and reproduce in different environments by the help of adaptation. (   )

- 4. Penguin's body is covered with dense feathers and a thin layer of fat to keep its body warm. ( )
- 5. Thick white fur is an adaptation in bears that live in polar regions. ( )
- 6. The sandy-colored fur of caracal helps it blend in with snow in polar environment. ( )
- 7. Some types of lizards have colored feathers to help them blend in with rocks in their ecosystem. ( )

4 Complete the following sentences by using these words :

(camouflage – habitat – adaptation – predator – prey)

- 1. The environment where living organisms live in is called ....
- 2. An animal that hunts and eats another animal is called a .... while .... is an animal that is hunted and eaten by another animal.
- 3. The characteristic that helps living organisms to survive and reproduce in the ecosystem is known as ....
- 4. Type of adaptation that some animals use to hide from their predators or their preys is known as .... *(Sharkia 2022)*

5 Write the scientific term of each of the following :

- 1. A characteristic that helps living organisms to survive and reproduce in the ecosystem in which they live. (.....................)
- 2. A bird that has a thick layer of fat and dense feathers to adapt extreme cold weather. (.....................)
- 3. It covers the body of some types of bears to blend in with snow and keeps their bodies warm. (.....................)
- 4. A type of foxes that has sandy-colored fur to adapt its desert environment. (.....................)
- 5. A property that helps animals to blend in with their surrounding environment. *(Cairo 2022)* (.....................)

6 Complete the following sentences :

- 1. The penguin's body can keep warm through a thick layer of .... and dense ....
- 2. A penguin can stand around on ice all day due to the weaving of .... around each other in its feet.
- 3. Forest bears have .... or .... colored fur, while polar bears have .... colored fur.
- 4. In desert environment, ... and .... are covered with sandy-colored fur.

5. Among animals that can live in desert ecosystem are .... lizard and .... fox.
6. The fur of a polar bear is thick to keep its body .... in polar climate, while it has .... color to blend in with snow.
7. The body of some types of lizards are covered with .... to blend in with colored rocks in their environments.
8. Among animals that can live in polar environment are .... and ....
9. Animals can blend in with their surrounding environments to hide from their .... and preys through .... property.

7 Give reasons for :

1. The starred agama lizard always looking for shade areas in desert.

....

2. The penguin's body has a thick layer of fat and dense feathers.

....

3. The blood vessels in the penguin's feet weave around each other.

....

....

4. Some desert lizards have colorful scales.

....

5. Fennec fox has sandy-colored fur, while polar bear has a white fur.

....

....

6. Some animals have the ability to make camouflage adaptation.

....

....

8 What happens if ... ?

1. The warm blood vessels and cold blood vessels in the penguin's feet do not weave around each other.

....

....

2. The polar bear has thin fur instead of its thick fur.

....

....

3. The body of fennec fox is covered with black fur.

....

....

4. Some types of lizards are not able to make camouflage adaptation.

....

....

9 Compare between :

• 1.

Points of comparison	Penguin	Fennec fox
1. Habitat :	....	....
2. Body coat :	....	....

• 2.

Points of comparison	Polar bear	Forest bear
1. Habitat :	....	....
2. Fur color :	....	....

10 Choose the animals that use camouflage adaptation to blend in with its environment :


a. Deer


b. Frog

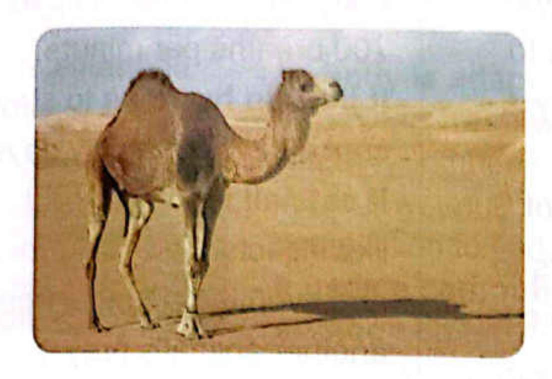

c. Cow


d. Lizard

LESSON 2

Activity 4 Types of Adaptations

▸ Look at the following pictures, then put (✓) or (×) :





1. Camel's body is covered with a special thick hairy skin to adapt to live in desert. (   )

2. Polar bear has thick white fur to adapt to live in forests. (   )

▸ In this lesson, we will study types of adaptations and explore these types in some animals.

Types of adaptations

	1. Structural adaptation	2. Behavioral adaptation
Definition	It is a change in the body structure of a living organism to help it survive.	It is a change in the behaviors or acts of a living organism to help it survive.
Examples	• The blood vessels in the penguin's feet. • The thick fur of the polar bear.	• Desert lizard looks for shade during hot sunny days. • Migration of some animals towards certain regions.

▸ Now, we will study types of adaptations in some different animals.

special	خاص	change	تغير / تغيير	behavioral adaptation	تكيف سلوكي
thick hairy skin	جلد سميك مشعر	structural adaptation	تكيف تركيبي	migration	الهجرة

1 Fennec fox :

Habitat	Structural adaptation	Behavioral adaptation
Hot dry desert Fennec fox	- **It has a tan-colored coat (sandy-colored fur) that :** • provides camouflage to hide in a sandy, rocky environment. • protects it from the hot Sun. - **It has extra-large ears** to help it lose the heat to cool its body.	- **It pants like dogs** to cool its body, where it takes up to 700 breaths per minute. - **It lives in burrows** to stay cool during the sunny days. - **It eats all kinds of food** like insects, fruit, plant roots and even the remains from another animal's prey.

2 Arctic fox :

Habitat	Structural adaptation	Behavioral adaptation
Tundra desert with temperature as cold as (50°C) below zero in the winter months. Arctic fox in winter Arctic fox in summer	- **It has a thick fur coat** to keep its body warm in extreme cold climate. - **Its fur coat is white during winter but turns brown in summer when the snow melts** to help it sneak up on prey in any season. - **It has short ears and legs** to help it stay warm.	- **It lives in burrows** to stay warm at night. - **It eats all kinds of food** like insects, fruit, plant roots and even the remains from another animal's prey.



Note

The special shape of ears in both fennec and arctic foxes allow excellent hearing to help them hunt.



Give reason for ...

Both fennec fox in hot dry desert and arctic fox in cold tundra eat all kinds of food

Because it is hard to find food in the hot dry desert and in the cold tundra.

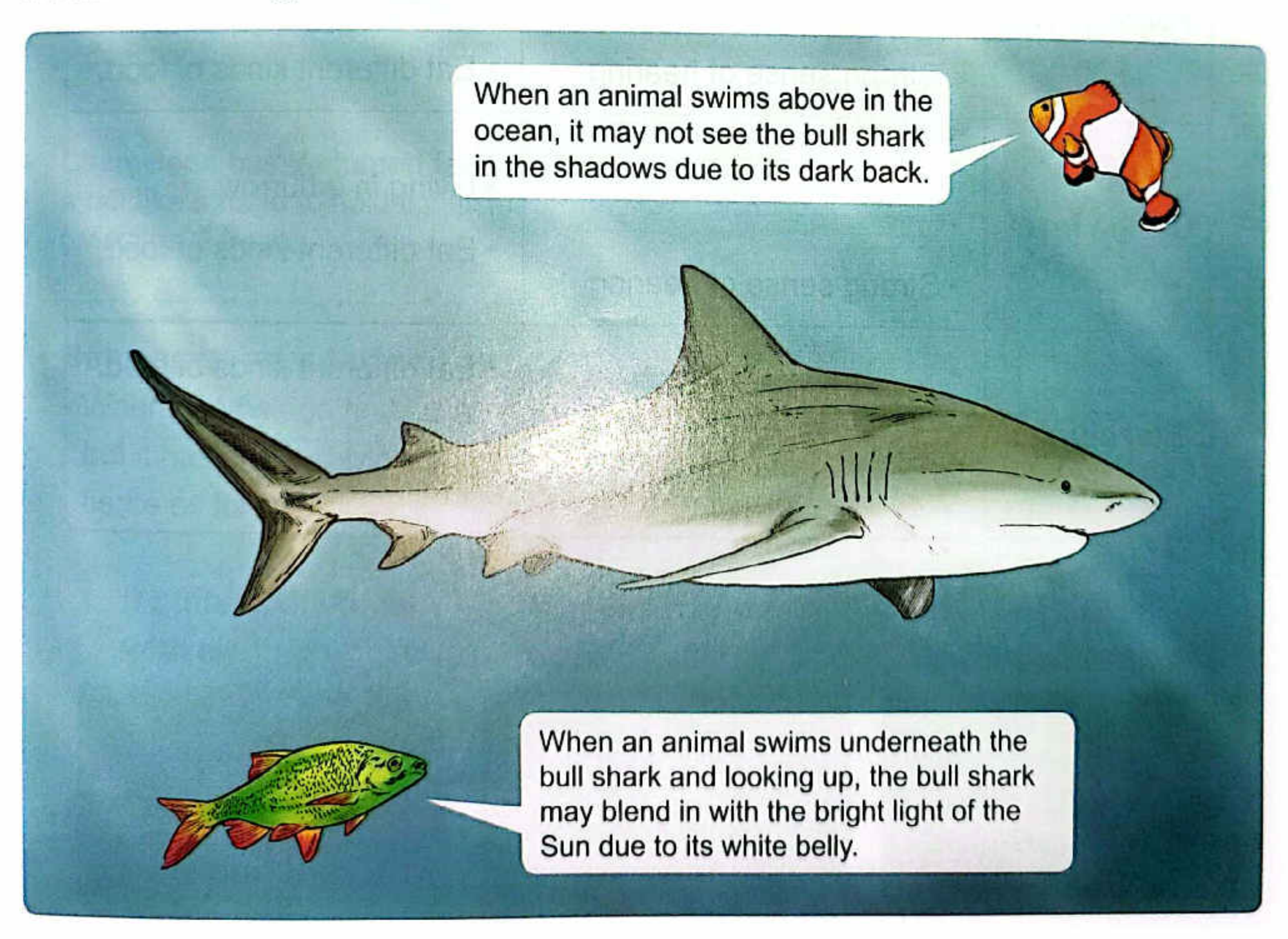
provide	يزود	burrows	جحور	arctic fox	الثعلب القطبي
pant	يلهث	remains	بقايا	tundra desert	صحراء التندرا

③ Bull shark :

▸ **Most sharks can live only in salt water but in bull sharks, their bodies have adapted to live in both fresh water and salt water.**

Habitat	Structural adaptation	Behavioral adaptation
Fresh water and salt water. Bull shark	- **Its body is adapted to survive in fresh water,** where no other sharks live in fresh water, so it has less competition to find food. - **It uses a camouflage strategy called "countershading",** where it has a dark back and white belly to sneak up on prey. - **It has sharp teeth** to cut its prey's flesh.	- **It eats different types of food** as it lives in both fresh water and salt water. - **It hunts during the day and at night,** so it can surprise its prey.

Countershading in bull shark :



bull shark	قرش الثور	competition	منافسة	belly	بطن
fresh water	مياه عذبة	sharp teeth	أسنان حادة	shadow	ظل
salt water	مياه مالحة	countershading	التباين اللونى	underneath	تحت



▸ **Write the scientific term :**

1. It is a change in the body structure of a living organism to help it survive. (..................)

2. It is a change in the behaviors or acts of a living organism to help it survive. (..................)

▸ **Use the following structural and behavioral adaptations of the following animals to complete the table below :**

Hunts in day and night – Tan-colored coat – Panting – Sharp teeth – Short ears and legs – Big ears – Can live in fresh water – Camouflage by season – Countershading.

Animals	Structural adaptation	Behavioral adaptation
Fennec fox :	• .... • .... • Strong sense of hearing.	• .... • Living in a burrow. • Eat different kinds of food.
Arctic fox :	• .... • .... • Strong sense of hearing.	• Living in a burrow. • Eat different kinds of food.
Bull shark :	• .... • .... •	• Eat different kinds of food. • ....

Activity 5 The Panther Chameleon

- **Lizards** are from **reptiles** that are an ancient type of animals found all over the world in different environments.
- Bodies of reptiles are covered with **scales** such as starred agama lizard and panther chameleon.

Adaptation of the panther chameleon to survive in its environment :

- **Habitat :**

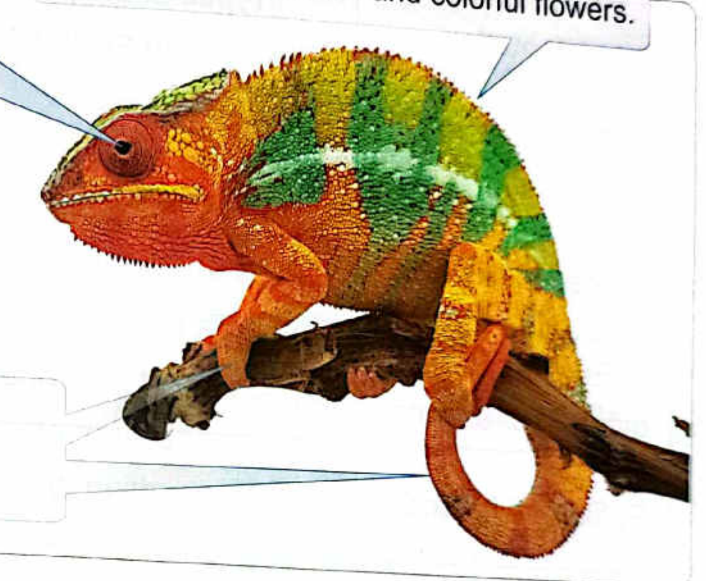
Tropical rainforest.

- **Structural adaptation :**

Chameleon eyes can face opposite directions, where each eye can move independently from the other, so :

- One eye can search for food like insects, while the other eye looks out for danger in a different direction.

Chameleon has brightly colored scales to help it make camouflage and hide between green leaves and colorful flowers.



Chameleon has V-shaped feet and a tail like a hand to hold tightly the branches of trees.

- **Behavioral adaptation :**

- When chameleon finds itself in danger, it doesn't have teeth or claws for defense, but it has one last trick to scare its enemies (attackers), where it appears as fierce as follows :

1. **It puffs up its body with air.**



2. **It opens its mouth wide.**



3. **It changes the colors of its scales.**



lizards	السحالى	hold tightly	تمسك بإحكام	scare	خوف
reptiles	الزواحف	last trick	الحيلة الأخيرة	puff up	ينتفخ
panther chameleon	حرباء النمر	fierce	شرس	attacker	مهاجم
independently	بشكل مستقل	tropical rainforest	الغابات الاستوائية المطيرة	claws	مخالب



Give reason for ...

The panther chameleon can hunt its prey and avoid becoming a prey at the same time.

Because it can search for food with one eye, while its other eye looks out for danger in a different direction.



Check your understanding

▸ **Complete the following table which describes the types of adaptations that help chameleon to survive :**

Adaptation	Types of adaptation : Structural (S) or Behavioral (B)	This adaptation helps chameleon to .....
Bright colored scales.	....	Camouflage to hunt and hide.
V-shaped like feet.	....	Balance and move.
Eyes move in different directions.	....	Hunt.
Puffing up its body.	....	Scare its enemies.
Changing colors.	....	Defend or survive.

In the Assessment Book :
Try to answer :
Self-Assessment (2)

balance توازن hunting الصيد defend

Exercises on Lesson 2

● Understand ● Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

1. All of the following sentences represent the meaning of adaptation, except ....
   a. it is the characteristic that helps living things survive.
   b. it is the characteristic that helps living things reproduce.
   c. it is the change that helps the animal to find a prey.
   d. it is the change that causes the death of the animal.
2. The color of fur of fennec fox protects it from ....
   a. wind. b. rains.
   c. hot climate. d. cold weather.
3. Fennec fox has a tan-colored coat that provides .... in its environment.
   a. camouflage b. respiration
   c. panting d. communication
4. Panting in fennec fox belongs to .... adaptation. *(Fayoum 2022)*
   a. only structural b. only behavioral
   c. both structural and behavioral d. neither structural nor behavioral
5. Fennec fox and arctic fox live in burrows, this belongs to .... adaptation.
   a. only structural b. only behavioral
   c. both structural and behavioral d. neither structural nor behavioral
6. All of the following properties help fennec fox to stay cool, except ....
   a. thick fur coat. b. make panting.
   c. tan-colored coat. d. extra-large ears.
7. Changing the color of body coat of arctic fox according to season, is considered as a type of ....
   a. behavioral adaptation. b. changing the way of breathing.
   c. structural adaptation. d. changing the way of drinking.
8. All of the following properties help arctic fox to stay warm, except ....
   a. thick fur coat. b. short ears.
   c. tan-colored coat. d. short legs. *(Qena 2022)*
9. Both fennec fox and arctic fox are similar in all of the following, except ....
   a. they live in the same habitat.
   b. they can eat different things.
   c. they have excellent hearing ability.
   d. they have different sized ears.

10. Bull sharks can live in ....
    a. fresh water only.
    b. salt water only.
    c. seas, rivers and mud.
    d. rivers, seas and oceans.

11. One of structural adaptations of bull sharks is that they ....
    a. can live in both salt water and fresh water.
    b. are flexible about what they eat.
    c. hunt in the day as well as the night.
    d. can live in salt water only.

12. When a panther chameleon stands within leaves of trees, the color of its scales changes into .... color.
    a. white
    b. green
    c. blue
    d. black

13. Special eyes of the panther chameleon belong to .... adaptation.
    a. only structural
    b. only behavioral
    c. both structural and behavioral
    d. neither structural nor behavioral

14. .... is considered as a behavioral adaptation in the panther chameleon.
    a. Puffing up its body during danger
    b. Each eye can move independently
    c. V-shaped feet
    d. Tail like a hand

15. All the following are structural adaptations in the panther chameleon, except ....
    a. each eye can move independently.
    b. openning its mouth wide during danger.
    c. its V-shaped feet.
    d. its tail like a hand.

2 Choose from columns (B) and (C) what suit them in column (A) :

(A) Animal	(B) Adaptation	(C) Helps it to ...
1. Chameleon	a. short ears and legs	A. stay cool
2. Fennec fox	b. V-shaped feet	B. stay warm
3. Arctic fox	c. change body colors	C. balance and move
4. Bull shark	d. panting	D. hide from its prey

1. ...... → ......   2. ...... → ......   3. ...... → ......   4. ...... → ......

3 Put (✓) or (✗) :

- 1. Living organisms can adapt their environmental conditions through structural adaptation and behavioral adaptation. *(Menofia 2022)* ( )
- 2. The behavioral adaptation is a change in the body structure of a living organism to survive. ( )
- 3. When the snow melts in polar regions, the thick fur coat of arctic fox turns black. ( )
- 4. The ears of arctic fox are larger than those of fennec fox. ( )
- 5. Fennec fox stays in burrows during day, while arctic fox stays in burrows at night. ( )
- 6. Both fennec and arctic foxes can eat insects, fruit, plant roots and the remains from other animal's prey. ( )
- 7. Fennec fox has sandy-colored fur to help it make camouflage. ( )
- 8. Arctic fox lives in tundra, while fennec fox lives in hot desert. ( )
- 9. Panting and staying in burrows are considered behavioral adaptations in fennec fox. ( )
- 10. All types of sharks live in fresh water. ( )
- 11. If a bull shark moves from a river to a sea, it will die. ( )
- 12. Bull shark uses countershading camouflage to sneak up on its prey. ( )
- 13. Chameleon uses its tail and V-shaped feet to hunt and move. ( )
- 14. The panther chameleon has teeth and claws, through which it can hunt and eat its prey. ( )
- 15. Starred agama lizard use one of its eyes for searching for food and the other one to look out for danger. ( )

4 Complete the following table :

Animal	Its adaptation	Structural or Behavioral adaptation
1.	Has blood vessels weave around each other.	....
2. Polar bear	Has thick white fur.	Structural
3. .... fox	Changes the color of its fur.	....
4. .... fox	Hiding inside burrows to stay cool.	....
5. Panther chameleon	Has eyes face opposite directions.	....

5 Write the scientific term of each of the following :

- 1. A change in the body structure of a living organism to survive. (..........)
- 2. A change in the behaviors or acts of a living organism to survive. (..........)
- 3. An animal has a tan-colored fur and panting like dogs. (..........)
- 4. A way by which fennec fox cools itself like dogs. (..........)
- 5. An animal that changes its fur color between winter and summer seasons. (..........)
- 6. A lizard that has multiple bright colored scales to provide camouflage in its environment and has V-shaped feet. (..........)
- 7. A shape of feet by which a panther chameleon holds tightly to branches of trees. (..........)
- 8. A feature in the bull shark, in which the upper surface of its body is darker than its lower surface. (..........)

6 Complete the following sentences :

- 1. Weaving of blood vessels around each other in penguin's feet is considered .... adaptation, while migration of birds to certain regions is considered .... adaptation. *(Assiut 2022)*
- 2. Tan-colored coat in fennec fox is considered .... adaptation, while its panting to stay cool is considered .... adaptation.
- 3. Among animals that live in hot environments are .... foxes, while .... foxes live in cold environments.
- 4. Extra-large ears allow heat to escape to cool the bodies of .... foxes, while short ears and legs help the .... foxes stay warm.
- 5. Short ears of arctic fox is considered .... adaptation, while its staying in burrows to be warm is considered .... adaptation.
- 6. A burrow is an excellent place for the .... fox to stay warm at night and for the .... fox to stay cool during the day.
- 7. The fur color of arctic fox is .... in winter but turns .... in summer.
- 8. The chance of bull shark to find a prey is more easier in .... water than in .... water.
- 9. Countershading strategy of the bull shark is considered .... adaptation.
- 10. Eyes of chameleon move independently of each other, this is considered as .... adaptation. *(Behira 2022)*

- 11. Chameleon puffs up its body with air for defense which is considered .... adaptation, while its V-shaped feet is considered .... adaptation.

7 Give reasons for :

- 1. Fennec fox has a tan-colored coat.

....

- 2. Fennec fox undergoes panting.

....

- 3. Arctic fox has a thick fur coat.

....

- 4. The fur of arctic fox is white during winter but it turns brown in summer.

....

- 5. Burrow is an excellent place for arctic and fennec foxes.

....

....

- 6. Fennec fox has extra-large ears, while arctic fox has short ears.

....

....

- 7. Bull sharks have less competition for finding food in fresh water.

....

- 8. Panther chameleon has V-shaped feet and a long tail.

....

8 What happens if ... ?

1. Arctic fox has a brown coat during winter but it turns white during summer.

....

2. Fennec fox has short ears.

....

3. Sense of hearing becomes weak in foxes.

....

4. Arctic fox has only a white coat during all seasons of the year.

....

5. Both eyes of panther chameleon move in one direction only.
....

6. Panther chameleon is exposed to danger.
....

9 Cross out the odd word :

1. Penguin – Polar bear – Fennec fox – Arctic fox. (..........)
2. Fennec fox – Starred agama lizard – Panther chameleon – Bull shark. (..........)
3. Panther chameleon – Polar bear – Fennec fox – Arctic fox. (..........)

10 Compare between :

Points of comparison	Fennec fox	Arctic fox
1. Habitat :	....	....
2. Color of fur :	....	....
3. Shape of ears :	....	....
4. Time of hiding in burrows :	....	....

11 Put (S) in front of structural adaptation and (B) in front of behavioral adaptati for each of the following statements :

1. Tan-colored coat of fennec fox. (..........)
2. Living of the arctic fox in burrows. (..........)
3. Living of bull shark in both salt water and fresh water. (..........)
4. Countershading of bull shark. (..........)
5. V-shaped feet of panther chameleon. (..........)
6. Change the colors of panther chameleon scales in danger cases. (..........)

12 Give only one example of behavioral adaptation in each of the following animals

1. Fennec fox : ....
2. Starred agama lizard : ....
3. Bull shark : ....
4. Panther chameleon : ....

13 Look at the following figures, then answer the questions :


Figure (1)


Figure (2)

1. What is the name of this animal and where does this animal live ?

....

2. Figure (1) represents this animal in .... season, while figure (2) represents this animal in .... season.

3. Why does the fur color of this animal change between summer and winter seasons ?

....

4. Mention one structural adaptation and one behavioral adaptation in this animal to adapt and survive in its environment :

- Structural adaptation :

....

- Behavioral adaptation :

....

LESSON 3

Activity 6 Plant Adaptations

▶ **Look at the opposite picture, then put (✓) or (×) :**

1. Cactus plant is adapted to grow and survive in rainforest habitat. ( )
2. Plants have structural and behavioral adaptations like animals to be able to survive in different environments. ( )



Cactus plant

- Plants can grow in every place that sunlight shines, even the bottom of sea ice in polar regions has tiny plants growing on it.
- Like animals, plants have structural and behavioral adaptations that help them survive and grow in their different environments.

▶ **Now, we will study two different terrific trees that grow in two different environments which are Savannah forest and Amazon rainforest.**

Savannah

Such as **Southern African Savannah.**

- It is a **grassland** habitat with a **mild** temperature.
- It is characterized by **extreme lack of water** during the dry season which lasts for half of the year without rainfall.
- There is one large tree can be seen scattered throughout the landscape which is Acacia tree (umbrella-shaped tree).

Amazon rainforest

Such as **Amazon rainforest of Brazil.**

- It is rainy most of the year, so it is **easy to find water.**
- It is characterized by **strong winds.**
- There is a tree that can be seen emerged high above other trees which is Kapok tree (umbrella-shaped tree).

Notes

1. In the Savannah grassland, most large plants cannot grow due to drought conditions as the dry season lasts half of the year.
2. In the Amazon rainforest, it is hard for plants to reach sunlight due to the extra tall trees growing up to 70 meters tall.

cactus plant	نبات الصبار	grassland	المراعى	acacia tree	ة السنط
savannah	السافانا	drought conditions	ظروف الجفاف	strong winds	شديدة
Amazon rainforest	غابات الأمازون المطيرة	terrific trees	شجرتان عملاقتان	mild temperature	ة حرارة معتدلة
kapok tree	شجرة الكابوك	lack of water	نقص المياه	scatter	ثر

Adaptation of the two different terrific trees to survive in their different environments :

① Acacia tree (umbrella-shaped tree)

- Acacia is adapted to survive through many months of drought in its environment as follows :



Acacia tree

- **Habitat :**

  Southern African Savannah.

- **Structural adaptation :**

Leaves

- **Tiny leaves grow on the top of the tree** to help them hold in water, while soaking up (absorbing) sunlight needed to make food.
- **There are sharp spines around the leaves** to prevent animals from eating these leaves.



Leaves of Acacia tree



Trunk

- **A very long trunk,** so most animals except **giraffe** cannot reach its leaves to feed on.



Note

The trunk in acacia tree stores water as the hump in the camel stores fat.

Root

- **A very long root called** taproot that grows directly downward to search for water as deep as 35 meters below the soil surface.

- **Behavioral adaptation :**

  Acacia tree can defend itself as follows :

- It **produces a poison** when an animal begins eating its leaves to make the leaves taste very bad to keep this animal away.
- It **sends a smelly message in the wind** to warn other acacia trees nearby telling them to start making the same poison.

tiny leaves	أوراق صغيرة	soak up	يمتص	hump	سنام
sharp spines	أشواك حادة	trunk	جذع	taproot	جذر رئيسي
send	يرسل	produce	ينتج	poison	سم
nearby	بالقرب من	smelly message	رسالة ذات رائحة		

2 Kapok tree (umbrella-shaped tree)


Kapok tree

- Kapok is adapted to survive in its environment through structural and behavioral adaptations as follows :

- **Habitat :**

  Amazon rainforest of Brazil.

- **Structural adaptation :**

  Leaves

  
  Leaves of kapok tree

  Hand-shaped leaves with narrow parts to allow wind to move more gently through the leaves without tearing them.

  Roots

  
  Buttress roots

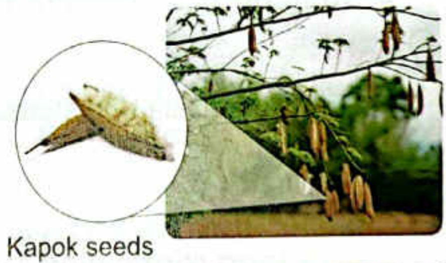
  Buttress roots of kapok tree

  - **Large, wide roots** called buttress roots.
  - Buttress roots are not planted deeply in the ground but they grow high up on its trunk to hold the tree firmly in the **soggy soil (wet muddy soil)**.


Note

Buttress roots can start up to 5 meters above the ground.

- **Behavioral adaptation :**
  - Kapok tree has **delicious-smelling flowers** to send messages through wind to attract **bats** towards it.
  - Kapok tree has **fluffy yellow seeds** to be easily carried by wind across the forest.



Kapok seeds



Check your understanding

▸ **Choose the correct answer :**

1. Sending a smelly message from acacia tree to warn other acacia trees is considered .... adaptation.

a. only structural b. only behavioral
c. both structural and behavioral d. neither structural nor behavioral

2. A structural adaptation of kapok tree is that ....

a. it has fluffy yellow seeds. b. it has buttress roots.
c. it has sharp spines around its leaves. d. it has a taproot.

narrow parts	الأجزاء الضيقة	delicious-smelling flowers	رائحة الزهور الطيبة	soggy soil	ربة رطبة
buttress roots	جذور داعمة	gently	بلطف	firmly	حزم
fluffy	رقيق				

Activity 7 Plant Scientist

- The scientist who studies plants is known as "botanist".
- Plants have different properties that help them to adapt and survive in their different environments through their structural adaptations as we will study in the following examples :

Plant	Habitat	Structural adaptation	Reason
Mangrove tree	Salt water	It has long and strong roots.	To resist the water waves.
Water lily	Wetland (Fresh water)	It has wide floating leaves.	To absorb a large amount of sunlight.
Pine tree	Snow	The pine tree has : - a triangular shape and short branches. - needle leaves.	- To allow the snow to slide easily over it, so its branches don't break. - To prevent the loss of water.
Palm tree	Desert	- It has thick roots and small leaves.	To resist the strong winds.

botanist	عالم النبات	pine tree	شجرة الصنوبر	wetland	أرض رطبة
resist	يقاوم	mangrove tree	شجرة المانجروف	palm tree	شجرة النخيل
water lily	زنبق الماء / اللوتس	water waves	أمواج الماء	needle leaves	أوراق إبرية

 Barbary fig	Desert	It has sharp spines and tough outer cover.	To prevent animals from eating its leaves and fruits.

▶ **From the previous table, we can conclude that :**

- All plants have roots, stems (trunks) and leaves.
- Plants differ in the structure and shape of their roots, stems and leaves to adapt the environmental conditions to survive and grow in their environments.



Plants were placed in different environment.

These plants may die or may adapt the new environmental conditions to survive and grow in their new environments.



Check your understanding

▶ Put (✓) or (✗) :

1. Palm tree has short roots and big leaves. ( )
2. Water lily plant lives in salt water. ( )
3. Mangrove tree has long and strong roots to help the plant to resist the water waves. ( )



Optional Digital Activity

Activity 8 " Identifying Adaptations " in the school book is an optional digital activity. You can do this avtivity by scanning its QR cod found in your school book.

In the Assessment Book :
Try to answer :
Self-Assessment (3)

barbary fig	تين شوكي	prevent	يمنع
environmental conditions	الظروف البيئية	tough outer cover	غطاء خارجي متين

Exercises on Lesson 3

● Understand ● Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

- 1. Savannah is characterized by all of the following except ....
  - a. it is a grassland habitat.
  - b. it is rainy most of the year.
  - c. it has a mild temperature.
  - d. it has extreme lack of water.
- 2. It is difficult for rainforest plants to get ....
  - a. water.
  - b. wind.
  - c. sunlight.
  - d. oxygen.
- 3. One of the behavioral adaptations of acacia tree is that ....
  - a. it has one very long root.
  - b. it has sharp spines around its leaves.
  - c. it has very tall trunk.
  - d. it produces a poison to make bad tasty leaves.
- 4. Acacia tree trunk and camel hump, ...
  - a. both store water.
  - b. both store fat.
  - c. the first stores fat and the second stores water.
  - d. the first stores water and the second stores fat.
- 5. All of the following properties protect acacia leaves from being eaten by animals, except that .... *(Minia 2022)*
  - a. they are high enough.
  - b. they are surrounded by sharp spines.
  - c. they are brightly colored.
  - d. they produce a poison.
- 6. The acacia tree warns the other nearby acacia trees from animals by sending ....
  - a. a watery message in the air.
  - b. a watery message in the water.
  - c. a smelly message in the air.
  - d. a smelly message in the water.
- 7 . When the nearby acacia trees receive the smelly message from the acacia tree, which exposed to be eaten by animals, they start to ....
  - a. lose water from their trunks.
  - b. invite bats to eat their leaves.
  - c. make a poisonous substance in their leaves.
  - d. fall down their leaves.

8. From umbrella-shaped trees are ....
   a. mangrove tree and acacia tree. b. mangrove tree and kapok tree.
   c. acacia tree and kapok tree. d. barbary fig and water lily.

9. The roots of kapok tree are not planted deeply in the soil, because ....
   a. the soil contains less water. b. the soil contains more water.
   c. the climate is very cold. d. the climate is very hot.

10. Kapok tree uses the wind to carry its fluffy yellow seeds across its ....
    a. desert habitat. b. snowy habitat.
    c. salt water habitat. d. rainforest habitat.

11. If a plant grows in a dry desert, it needs .... to adapt for getting water.
    a. long branches b. long leaves
    c. long roots d. more sunlight

12. If a plant grows in a rainforest, where it is hard to reach sunlight, so it needs .... to adapt for getting more sunlight.
    a. small roots b. a very tall trunk
    c. sharp spines d. a very short trunk

13. If a plant grows in a snow habitat, so it needs all of the following characteristics, except .... to adapt this habitat.
    a. short branches b. triangular shape
    c. needle leaves d. wide leaves

14. All of the following are adaptations of different plants to keep animals away from them, except that they ....
    a. produce poison.
    b. gather their branches high above.
    c. have delicious-smelling flowers.
    d. have sharp spines.

15. Desert plants are characterized by all of the following, except that they ....
    a. store water. b. have wide leaves.
    c. have long roots. d. have sharp spines.

16. Palm tree has tiny leaves like ....
    a. pine tree. b. kapok tree.
    c. acacia tree. d. water lily plant.

17. One of the structural adaptations of water lily plant is that .... *(Giza 2022)*
    a. it has long roots. b. it has sharp spines.
    c. it has tiny leaves. d. it has wide leaves.

18. Mangrove tree has long and strong roots to ....

    a. resist the strong wind. b. resist the water waves.

    c. prevent the loss of water. d. absorb the underground water.

19. Pine tree has a triangular shape to make snow slides over its branches without breaking it. This structural adaptation makes this tree face the extreme cold climate like the feet of ....

    a. caracal. b. penguin.

    c. fennec fox. d. brown bear.

20. Barbary fig keeps animals away like acacia trees by its ....

    a. sharp spines. b. poison.

    c. smell. d. long leaves.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Long and strong roots 2. Wide leaves 3. Needle shaped leaves 4. Sharp spines 5. Hand-shaped leaves	a. prevent animals from eating barbary fig. b. make mangrove tree resists the water waves. c. carries the kapok tree's fluffy yellow seeds across the forest. d. allow wind to move more gently through the leaves of kapok tree. e. allow water lilies absorb large amount of sunlight. f. prevent the loss of water in pine tree.

1. .... 2. .... 3. .... 4. .... 5. ....

3 Put (✓) or (✗) :

1. Plants have structural adaptation only to help them survive and grow in different environments. *(Fayoum 2022)* (   )
2. The rain falls for 6 months in Southern African Savannah. (   )
3. The taproot of acacia tree grows deeply downward searching for water. (   )
4. Acacia leaves are protected from being eaten by animals as they have brightly colored leaves. (   )
5. Acacia tree and kapok tree use wind to send messages. (   )
6. Acacia tree has delicious-smelling flowers to attract bats towards it. (   )
7. Hand-shaped leaves of kapok tree is considered as a behavioral adaptation. (   )

8. The transfer of kapok tree fluffy yellow seeds by wind across the rainforest is considered as a behavioral adaptation. (
9. One of the structural adaptations of acacia tree is that it has a large, wide roots called buttress roots. (
10. Mangrove trees adapt to resist the water waves through their long, strong roots. *(Sharkia 2022)* (
11. Water lily has wide leaves to absorb a large amount of sunlight. (
12. Pine trees that live in desert habitat have needle leaves to prevent the loss of water. (
13. Having thick roots are behavioral adaptation of palm trees to resist strong winds. (
14. Animals can't eat barbary fig due to its sharp spines. (
15. Plants of dry desert habitat adapt to store water. (
16. Some plants have sharp spines to absorb a large amount of sunlight. (

4 Write the scientific term of each of the following :

1. A tree that grows in Southern African Savannah and it has sharp spines around its leaves. (..................
2. A structural adaptation of acacia tree that allows it to search for water. (..................
3. A structural adaptation that surrounds the leaves of acacia tree to prevent animals from eating them. (..................
4. A tree that grows in Amazon rainforest of Brazil and it has hand-shaped leaves. (..................
5. A structural adaptation that fixes the kapok tree in soggy soil and support its trunk. (..................
6. The part of the kapok tree which is supported by the buttress roots. (..................
7. A tree lives in salt water habitat and has long, strong roots to resist the water waves. (..................
8. A plant lives in wetland habitat and it has wide leaves to absorb a large amount of sunlight. (..................
9. A structural adaptation in water lilies that helps them absorb a large amount of sunlight. (..................
10. A structural adaptation that prevents the loss of water in the pine tree. (..................

5 Complete the following sentences :

- 1. Acacia tree defends itself by producing .... that makes leaves taste terrible, while chameleon defends itself by puffing up its .... with air.
- 2. Kapok tree grows in Amazon rainforest habitat which has .... soil.
- 3. The hand-shaped leaves of kapok tree allow .... to flow through them gently.
- 4. The kapok tree spreads the smell of its flowers to attract .... towards it.
- 5. Among the plants that can survive in habitats that have lackage of water are .... , ... and ....
- 6. The leaves of .... tree in hot weather habitat store water, while the needle leaves of .... tree in snowy habitat prevent the loss of water.
- 7. The leaves of water lilies are wide in order to .... on the water surface and to absorb a large amount of ....
- 8. Drought regions are characterized by lacking of .... so, their plants adapt by having very long ....
- 9. The structural adaptation of .... tree can resist water waves, while the structural adaptation of .... tree can resist strong winds.
- 10. The leaves of .... plant allow it to absorb a large amount of sunlight, while the leaves of .... tree allow wind to move easily through these leaves without tearing them.

6 Give reasons for :

- 1. Branches of acacia tree gather on the top of its trunk.

  ....

  ....
- 2. Acacia tree has sharp spines around its leaves.

  ....
- 3. Wind is important to acacia tree.

  ....

  ....
- 4. Kapok tree has hand-shaped leaves.

  ....

  ....
- 5. Kapok trees stay firmly rooted in the soggy soil although they are very tall.

  ....

6. Pine tree has a triangular shape and short branches.

....

7. Water lilies have wide floating leaves.

....

8. Mangrove tree has long and strong roots.

....

9. Palm trees have thick roots and small leaves.

....

10. Barbary fig has sharp spines.

....

7 What happens if ... ?

1. The length of acacia taproot doesn't exceed 3 meters downward.

....

2. The acacia leaves are not guarded by sharp spines.

....

3. There are no buttress roots in the kapok tree.

....

4. The pine tree has an umbrella shape not a triangle shape.

....

....

5. Some plants of rainforest habitat became very short.

....

6. Water lily has narrow leaves instead of wide leaves.

....

7. Palm tree has thin roots and large leaves.

....

8 Cross out the odd word :

1. Taproot – Tiny leaves – Buttress roots – Producing a poison. (..............
2. Taproot – Hand-shaped leaves – Soggy soil – Buttress roots. (..............
3. Cactus plant – Barbary fig – Palm tree – Mangrove tree. (..............
4. Acacia tree – Polar bear – Penguin – Pine tree. (..............

9 Compare between :

• 1.

Points of comparison	Acacia tree	Kapok tree
1. Type of roots :	....	....
2. Shape of leaves :	....	....

• 2.

Points of comparison	Kapok tree	Water lily plant	Pine tree
1. Habitat :	....	....	....
2. Shape of leaves :	....	....	....

10 Read the following paragraphs, then correct the underlined words :

1. Water lilies live in <u>desert</u> habitat, so they have wide <u>roots</u> that float on the water surface to absorb a large amount of <u>water</u>.

....

2. Plants of desert habitat have thick and <u>short</u> roots to resist the strong <u>water waves</u> and search for water such as <u>pine</u> trees and barbary fig plant.

....

3. Pine trees live in <u>Savannah</u> habitat, so they have <u>long</u> branches and needle leaves which prevent the plant from losing of <u>sunlight</u>.

....

11 Classify the following living organisms according to their habitats into organisms live in deserts and organisms live in forests in the table below :

(Starred agama lizard – Panther chameleon – Fennec fox – Kapok tree – Palm tree – Barbary fig plant)

Organisms live in deserts	Organisms live in forests
....	....
....	....
....	....
....	....

LESSON 4

Activity 9 Digestive System

▶ **Look at the following figures, then complete the sentences below :**

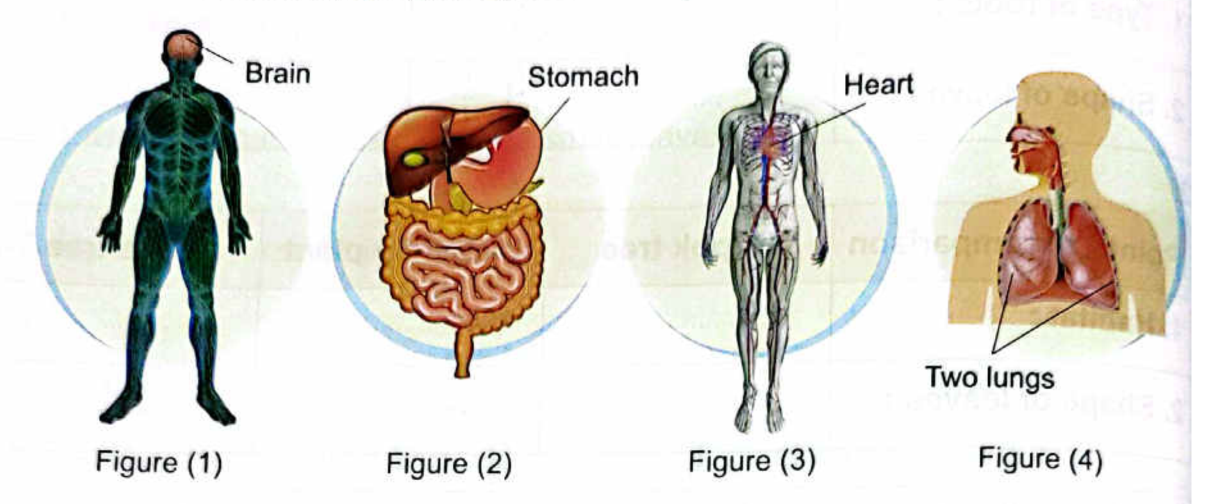


Figure (1) Figure (2) Figure (3) Figure (4)

1. Figure .... represents the human digestive system.
2. Figure .... represents the human respiratory system.

How do body systems adapt to meet the needs of living organisms

- **Each living organism has different ways to adapt to live in its environment, s**
  - The body of a living organism (human or animal) is made up of systems such digestive system, respiratory system, nervous system, ... etc.

System :

It is a group of organs that work together to perform a specific job (function).



Note

Digestive system and respiratory system are working together to get energy from food and breathing.

▶ **In this lesson, we will study :**

- Human digestive system.
- Digestive systems of different animals.
- Human respiratory system.

brain	المخ	specific job	وظيفة محددة	breathing	
stomach	المعدة	digestive system	الجهاز الهضمي	nervous system	العصبي
heart	القلب	organs	أعضاء	respiratory system	التنفسي
two lungs	الرئتين	energy	طاقة		

- **Why do we need to eat food ?**

  Because food contains different nutrients (vitamins, proteins, ... etc.) that give us energy to :
  - do activities as walking, talking and even during sleeping.
  - do body functions as heart beating, breathing and thinking.

Note

In one day, your body needs a lot of energy, so :
- your heart beats around 100.000 times.
- you breathe over 20.000 times.

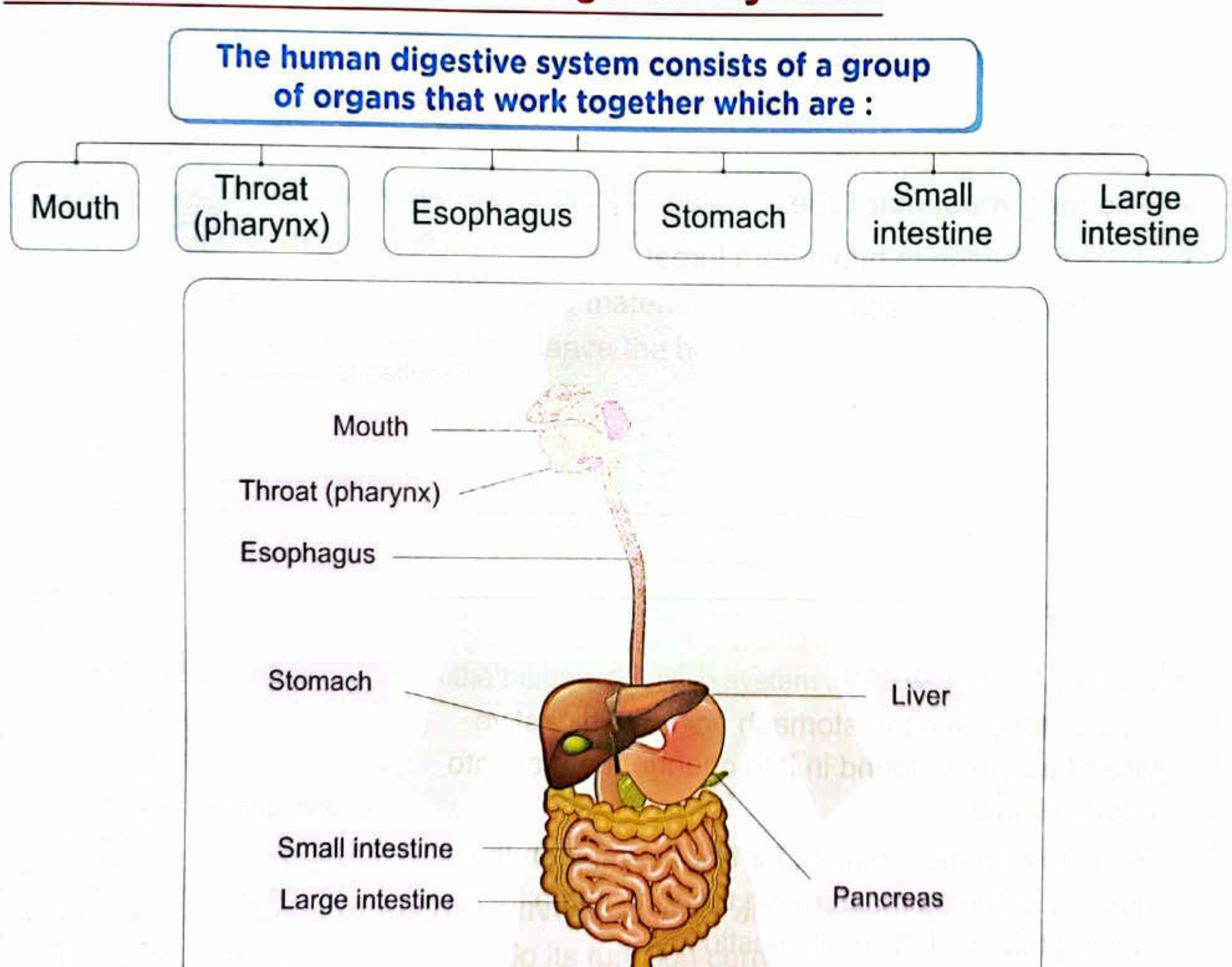
Human digestive system :

- The digestive system breaks down food into smaller parts that your body can use in a process called digestion process.

Digestion process :

It is a process of breaking down food into smaller parts that the body cells absorb and use them to get energy and growth.

The structure of the human digestive system :



The human digestive system

nutrients	المغذيات	esophagus	المريء	throat (pharynx)	البلعوم	pancreas	البنكرياس
heart beats	ضربات القلب	body functions	وظائف الجسم	small intestine	الأمعاء الدقيقة	large intestine	الأمعاء الغليظة
digestion process	عملية الهضم	mouth	فم	liver	الكبد	anus	فتحة الشرج

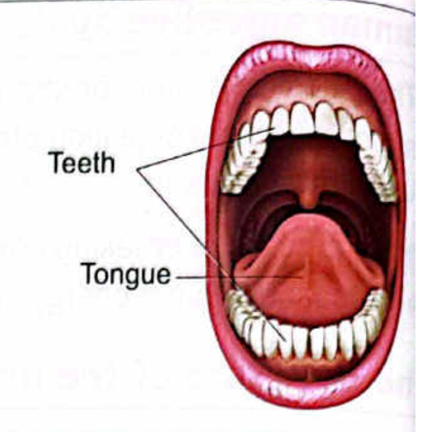
Note

Digestive system starts with **mouth** and ends with **anus**.

Description and function of organs of human digestive system

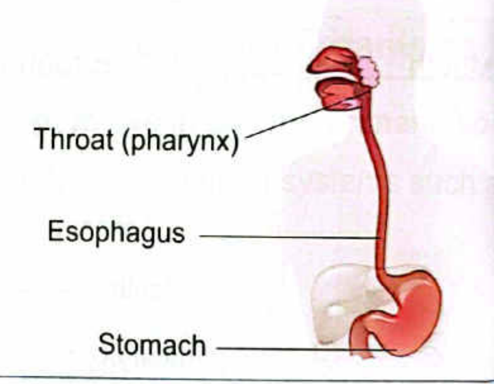
Mouth

- Digestion process begins in the **mouth**.
- **Mouth contains :**
  - **Teeth** : They crush food during chewing
  - **Saliva :** - It is a liquid substance in the mouth.
    - It moistens food and begins to break it down.
  - **Tongue :** It mixes food with saliva in the mouth.



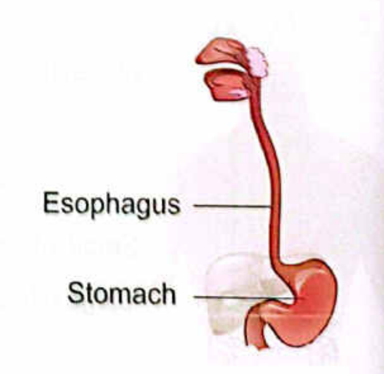
Esophagus

- It is **a long muscular tube**.
- It allows the food to move from throat down into the stomach.



Stomach

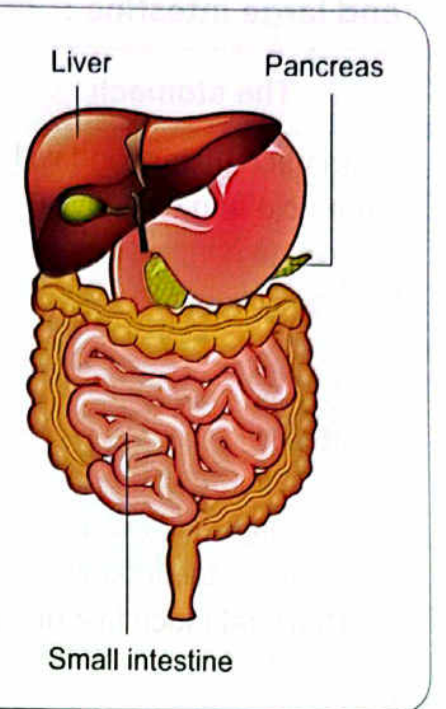
- It is **a muscular organ**.
- It mixes food with the stomach acid and digestive juices (enzymes) found in it to change the food into a soupy liquid.
- Food stays in the stomach for few hours, then the muscles of the stomach move the food into a long, winding tube called small intestine.



description	وصف	stomach acid	حمض المعدة	crush	حق
saliva	اللُعاب	enzymes	انزيمات	chew	ضغ
long muscular tube	أنبوب عضلى طويل	function	وظيفة	digestive juices	صارات هضمية
muscular organ	عضو عضلى	substance	مادة	moisten	بلل

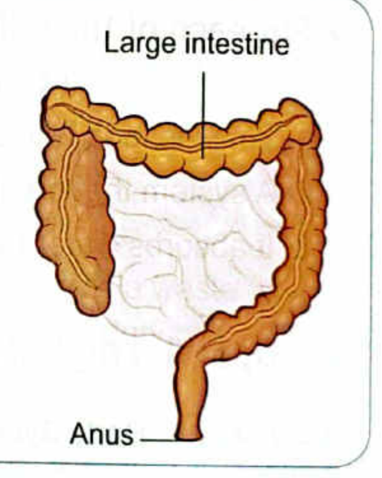
Small intestine

- It is **a long, winding tube** as its length is more than six meters.
- The juices of **pancreas** and **liver** flow into the small intestine and help in breaking down the food into nutrients (or digested food).
  - The walls of the small intestine absorb these nutrients through tiny blood vessels to carry them to all body parts.
- The body does not benefit from some parts of food known as undigested materials that flow into the large intestine.



Large intestine

- It is a tube that starts from the end of the small intestine and ends with the anus.
- It absorbs water from the undigested materials, so they become solid wastes that leave the body through the anus.



Note

The properties of all organs of the human digestive system are considered as structural adaptations.

What happens if ... ?

One of the organs of the digestive system is absent.
The digestive system could not do its function correctly.

benefit	منفعة	undigested materials	مواد غير مهضومة	properties	خصائص
flow	تدفق	solid wastes	الفضلات الصلبة		

▶ **Comparison between what the functions of the stomach, small intestine and large intestine :**

The stomach	The small intestine	The large intestine
Stomach mixes food with the acid and digestive juices to change it into a soupy liquid.	The juices of liver and pancreas that flow into the small intestine help in breaking down food into nutrients.	Large intestine absorbs the water from undigested materials, so no digestion occurs in large intestine.



Note

How can you keep the digestive system healthy ?

1. Drinking a lot amount of water.
2. Chewing the food well.
3. Don't eat much fast meals.



Check your understanding

▶ **Put each of the following words in front of its suitable sentence :**

(Stomach – Large intestine - Digestive system)

1. It mixes food with acid and digestive juices. (..................
2. A system that breaks down food into smaller parts. (..................
3. It absorbs water from the undigested materials. (..................

Optional Digital Activity

Activity 10 " Body Systems " in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.



take place يحدث | healthy صحي | fast meals وجبات سريعة

Activity 11 Respiratory System

Human respiratory system :

- Our bodies need oxygen in order to do their functions.
- We get oxygen gas from the air around us all the time.
- We cannot store extra oxygen in our bodies, so we must constantly take in new oxygen.
- The respiratory system is the system responsible for breathing (respiration).



- The respiratory system supplies the body with oxygen gas and gets rid of carbon dioxide gas through the respiration process.

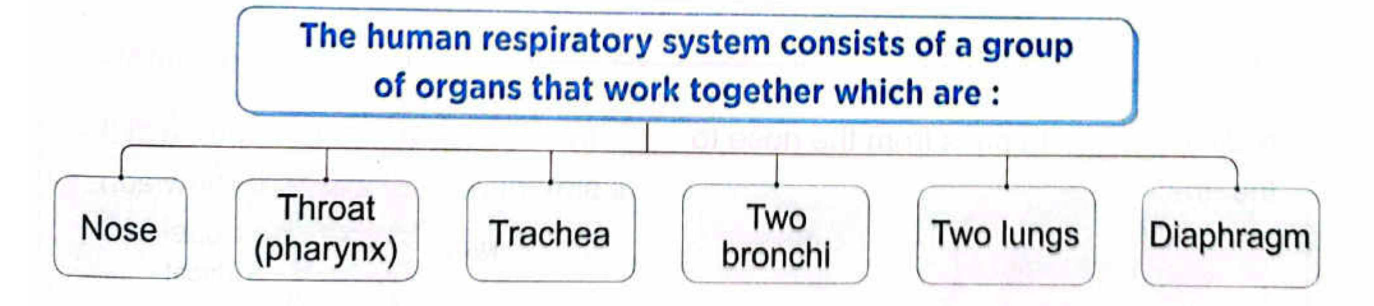
Respiration process :

It is a process of pulling air in (inhalation) and pushing air out (exhalation) of the body.

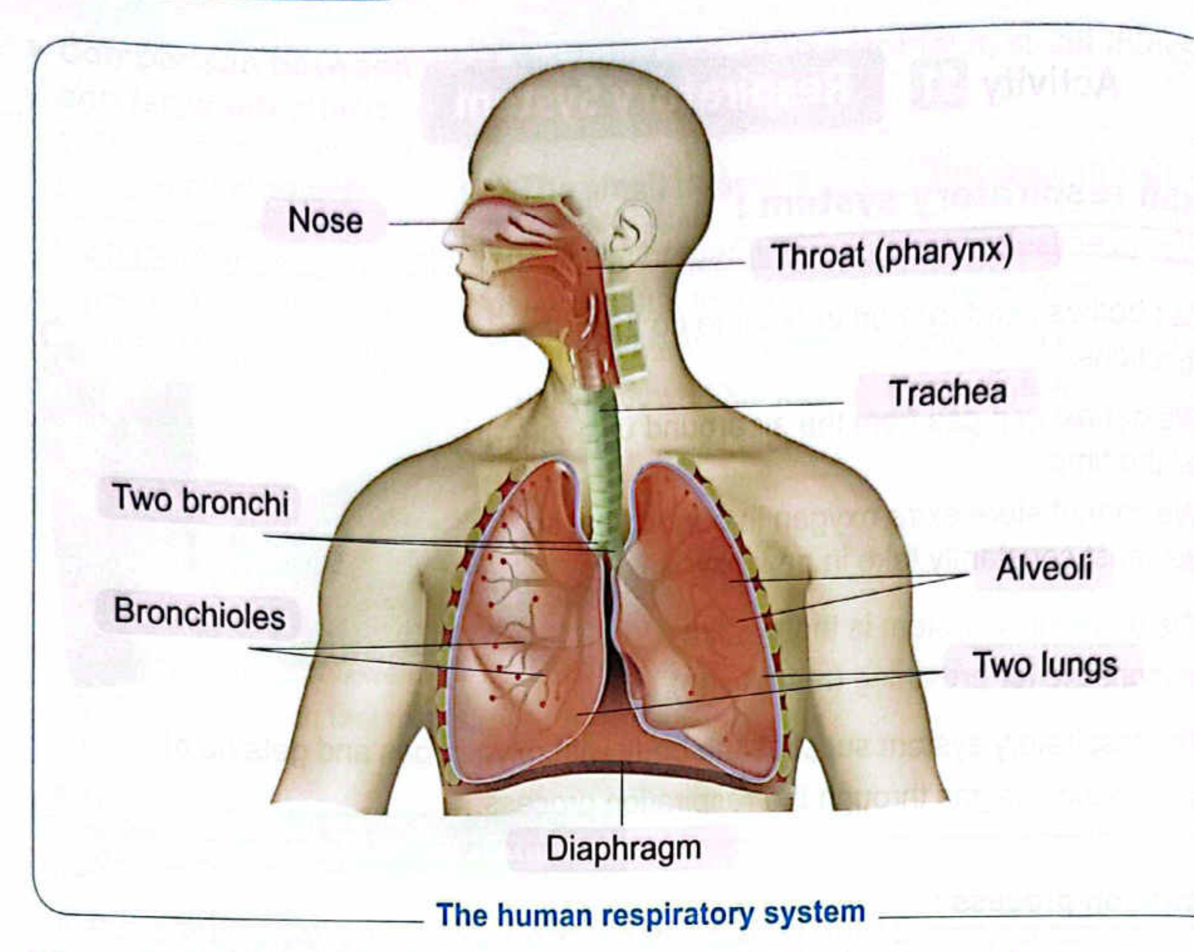


Carbon dioxide gas which is produced during respiration process is a waste product. This gas is harmful to our bodies so, we must expel it out during exhalation.

The structure of the human respiratory system :



constantly	باستمرار	trachea	القصبة الهوائية	expel out	يطرد
exhalation	زفير	inhalation	شهيق	two bronchi	الشعبتان الهوائيتان
harmful	ضار	get rid of	يتخلص من	diaphragm	الحجاب الحاجز
nose	أنف				

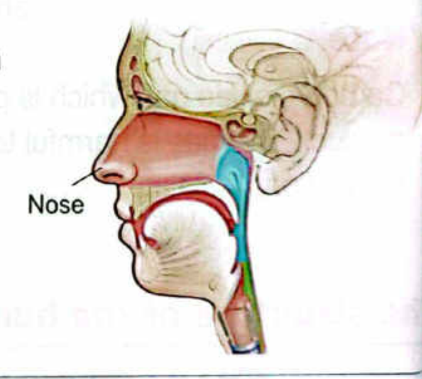


The human respiratory system

How does the respiratory system work ?

Nose :

It is the first organ of the respiratory system through which the air enters the body.



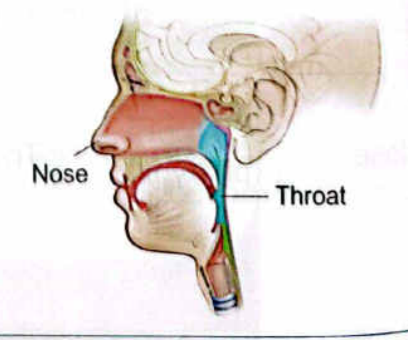


Note

The air can enter the body through the nose and the mouth.

Throat :

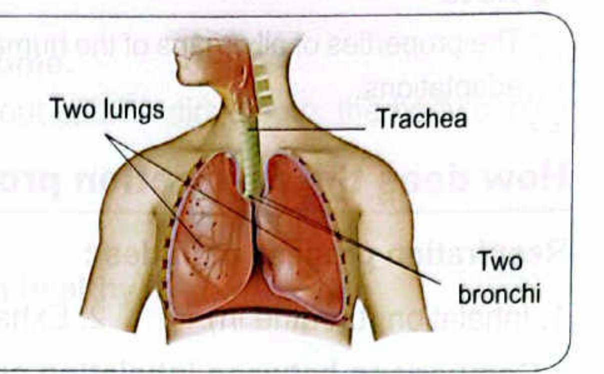
It allows the air to pass from the nose to the "trachea"



 bronchioles الشعيبات الهوائية alveoli (air sacs) الحويصلات الهوائية

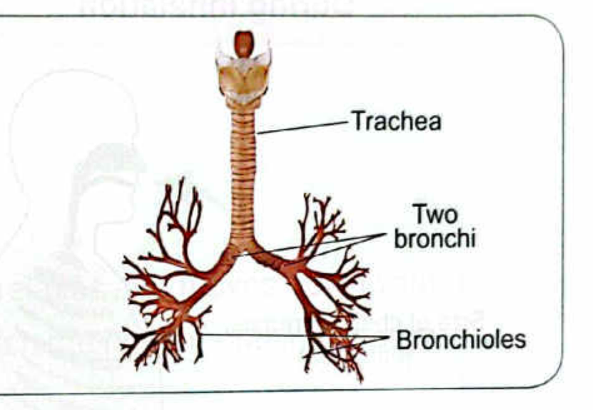
Trachea :

- It is a tube that allows air to pass into the "two lungs" which fill up with air like two balloons.
- Inside the lungs, the trachea is branched into two tubes known as "two bronchi"



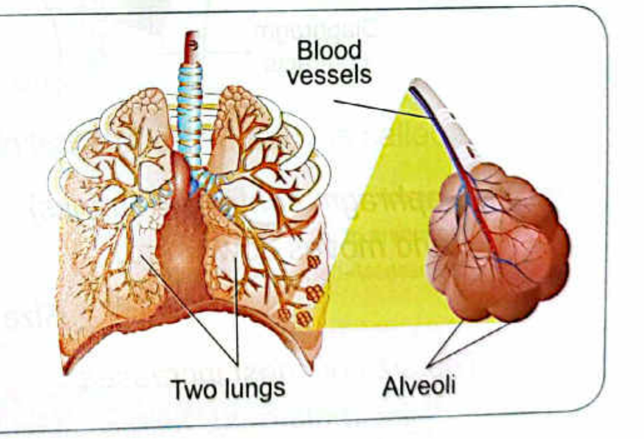
Two bronchi :

- They allow the air to enter the two lungs.
- They are divided into smaller and smaller tubes that look like the branches of a tree known as "bronchioles".



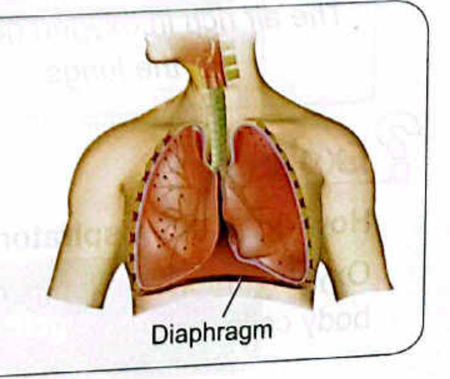
Two lungs

- Inside the lungs, the bronchioles end with little air sacs, surrounded by blood vessels known as "alveoli".
- Inside the blood vessels, oxygen moves into the blood which carries oxygen around the body to help other organs and systems to work.



Diaphragm :

- It is a large muscle at the base of ribs which plays an important role in inhalation and exhalation.





Note

The properties of all organs of the human respiratory system are considered as structural adaptations.

How does the respiration process take place ?

Respiration process includes :

1. Inhalation (breathe in). 2. Exhalation (breathe out).

▸ **Comparison between inhalation and exhalation :**

During inhalation	During exhalation
Size of chest increases (enlarges) Diaphragm contracts	Size of chest decreases (becomes narrow) Diaphragm relaxes
Diaphragm muscle	
The diaphragm contracts (shrinks) and moves downward.	*The diaphragm relaxes (expands) and moves upward.*
Size of chest	
The size of chest increases (enlarges).	*The size of chest decreases (becomes narrow).*
Type of air	
The air rich in oxygen gas enters the lungs.	*The air rich in carbon dioxide gas is expelled out of the lungs.*

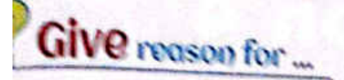


Explain ?

How does the respiratory system get oxygen to the body cells ?

Oxygen enters the lungs during inhalation, then the blood carries oxygen to all the body cells.

chest	صدر	contract (shrink)	ينكمش
expand	يتمدد	relax	يرتخي



We can't hold our breath for a very long time.

Because we can't inhale oxygen and expel out carbon dioxide so, the body can't perform its vital processes.

Note

How can you keep the respiratory system healthy ?

1. Breathing clean air.
2. Eating fruits rich in vitamin (C) such as orange and guave.
3. Avoiding smoking and smoking areas.

Check your understanding

Put (✓) or (✗) :

1. During inhalation, the diaphragm muscle relaxes and moves downward. (   )
2. Respiration process is the process by which the human obtains energy from burning of the digested food. (   )

Complete :

1. Respiration process includes .... and ....
2. The process of pulling air in and pushing air out of the body is called .... process.

In the Assessment Book :
Try to answer :
Self-Assessment (4)



ur breath	حبس أنفاسنا	smoking area	منطقة مخصصة للتدخين	obtain	يحصل على
rocesses	العمليات الحيوية	perform	يؤدي		

Exercises on Lesson 4

● Understand ● Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

1. The energy that the living organism needs to perform different functions is obtained from ....
   a. breathing only.
   b. food processing only.
   c. breathing and running.
   d. breathing and food processing.

2. All of the following are organs of the digestive system <u>except</u> ....
   a. mouth. b. nose. c. stomach. d. esophagus.

3. Digestion process begins in the ....
   a. stomach. b. esophagus. c. mouth. d. small intestine.

4. Which of the following organs does not share in breaking down of food ? ....
   a. Mouth. b. Stomach. c. Lungs. d. Small intestine.

5. Crushing the food in your mouth is the function of .... *(Behira 2*
   a. stomach. b. tongue. c. saliva. d. teeth.

6. All of the following are correct about the mouth, <u>except</u> ....
   a. it is the first organ in the digestive system.
   b. it has teeth. c. it has tongue.
   d. it moves directly food to the stomach.

7. Saliva in the mouth makes the food become soft and mushy with the help of ....
   a. teeth only. b. tongue only.
   c. teeth and esophagus. d. teeth and tongue.

8. The throat is connected to the stomach through ....
   a. esophagus. b. trachea. c. small intestine. d. large intestine.

9. The organ that moves the food into the stomach is ....
   a. mouth. b. tongue. c. esophagus. d. small intestine.

10. The food passes from the stomach to the .... directly.
   a. esophagus b. small intestine c. large intestine d. anus

11. The stomach mixes the food with .... to help in digestion of food.
   a. digestive juices only b. stomach acid only
   c. saliva and digestive juices d. stomach acid and digestive juices

12. The liver and .... pour their juices into the small intestine.
    a. throat b. esophagus c. large intestine d. pancreas
13. The long winding tube that its length is about more than six meters is called ....
    a. large intestine. b. small intestine.
    c. esophagus. d. stomach.
14. The undigested food pass from the small intestine into the ....
    a. liver. b. pancreas. c. brain. d. large intestine.
15. In the large intestine, ... is absorbed from the undigested food.
    a. starch b. fat c. water d. oil
16. The solid wastes of undigested food become useless to the body, so the body must expel them outside it through the ....
    a. mouth. b. anus.
    c. large intestine. d. small intestine.
17. All organs of the human digestive system are considered as .... adaptation.
    a. only structural b. only behavioral
    c. structural and behavioral d. neither structural nor behavioral
18. During inhalation, air enters through .... then down the throat.
    a. nose and trachea b. nose and mouth
    c. mouth and lungs d. mouth and trachea
19. The passage of air during inhalation is ....
    a. throat – nose – lungs – trachea.
    b. trachea –throat –lungs – nose.
    c. lungs – nose – throat – trachea.
    d. nose – throat – trachea – lungs.
20. The throat is connected to the lungs through ....
    a. esophagus. b. trachea. c. small intestine. d. ribs.
21. Inside the two lungs, at the end of the smaller air passages (bronchioles) there are tiny air sacs surrounded by ....
    a. air. b. water. c. small intestine. d. blood vessels.
22. Inside the lungs, the trachea is branched into two tubes known as ....
    a. alveoli. b. air sacs. c. bronchi. d. blood vessels.
23. The oxygen gas moves from air into blood at the ....
    a. nose. b. throat. c. trachea. d. lungs.

24. All of the following happen during exhalation, except ....

a. diaphragm relaxes. b. diaphragm contracts.
c. diaphragm moves upward. d. the size of chest decreases.

2 Choose from column (B) what suits it in column (A) :

1.

(A)	(B)
1. Esophagus 2. Small intestine 3. Large intestine 4. Stomach 5. Mouth	a. absorbs water from the undigested food to become solid wastes. b. mixes the food with an acid and digestive juices. c. digestion begins in it. d. is a long winding tube, its length is more than 6 meters. e. is a muscular tube that moves the food down into the stomach. f. solid wastes leave the body through it.

1. .... 2. .... 3. .... 4. .... 5. ....

2.

(A)	(B)
1. Trachea 2. Blood 3. Diaphragm 4. Lungs	a. is a large muscle at the base of the ribs and helps in inhalation and exhalation. b. are like balloons and they contain little sacs surrounded by blood vessels. c. carries oxygen to all the body organs. d. is a tube through which air travels down into the lungs e. air enters the body through them.

1. .... 2. .... 3. .... 4. ....

3 Put (✓) or (✗) :

1. The digestive system consists of similar organs that work together to get nutrients from food. (
2. The human body gets oxygen gas from food. (
3. Mouth, nose, esophagus and stomach are from the organs of the digestive system. (
4. The food passes through the large intestine before it goes into the small intestine. *(Sohag 2022)* (

5. Digestion process begins in the stomach with the help of saliva. ( )
6. Tongue and teeth moisten the food, while saliva crushes the food until it becomes soft. ( )
7. Food passes from mouth to stomach through a narrow tube known as small intestine. *(Qena 2022)* ( )
8. Food usually stays in stomach for few hours until it becomes a soupy liquid. ( )
9. Stomach mixes the food with juices that come from liver and pancreas. ( )
10. The food gets broken down into nutrients in the small intestine. ( )
11. The walls of the small intestine absorb the nutrients through tiny blood vessels then blood carries them to all the body parts. ( )
12. Swallowing food without chewing keeps the digestive system healthy. ( )
13. Digestive system ends by anus. ( )
14. The air travels down into the lungs through esophagus. ( )
15. During inhalation, the size of chest becomes narrow. ( )
16. During exhalation, the diaphragm expands. *(Sohag 2022)* ( )
17. The inhaled air is rich in carbon dioxide gas, while the exhaled air is rich in oxygen gas. ( )
18. Exposing to air rich in dust harms the respiratory system. ( )

4 Write the scientific term of each of the following :

1. A system that helps in breaking down food into smaller parts. (.....................)
2. A group of organs that work together to perform a specific job. (.....................)
3. A process of breaking down food into smaller parts that the body cells absorb and use to get energy and growth. (.....................)
4. The organ, where the digestion process begins. (.....................)
5. They present in the mouth and play an important role in crushing of food. (.....................)
6. A liquid substance in your mouth that moistens the bite of food and begins to break it down. (.....................)
7. The organ which receives the food from esophagus. (.....................)
8. An organ that has tiny blood vessels to absorb the nutrients through its walls. (.....................)
9. An organ through which solid wastes of digestion leave the body. (.....................)

- 10. A long muscular tube that moves the food down into the stomach. (..........
- 11. A process of pulling air in and pushing air out of the body. (..........
- 12. Little air sacs surrounded by blood vessels in the respiratory system. (..........
- 13. A large muscle that contracts during breathing in and relaxes during breathing out. *(Beni Suef 2022)* (..........

5 Complete the following sentences :

- 1. The human body uses .... system to get nutrients from food and uses .... system to get oxygen from air.
- 2. In order for food to become soft, the .... and .... work to mix an grind (crush) the food well.
- 3. In the digestive system, food becomes a soupy liquid in the .... , while breaks down into nutrients in ....
- 4. The .... is a tube that has muscles to move the food down into the stomach, while .... is a long winding tube, its length is more than six meters.
- 5. The longest part of the digestive system where most digestion takes place inside it is ....
- 6. The small intestine receives juices from .... and .... that help in digestion process.
- 7. The walls of the small intestine absorb the digested food and transfer it into your blood stream through ....
- 8. In the digestive system, ... intestine absorbs the nutrients through its wall, while .... intestine absorbs water from the undigested food.
- 9. Air enters and exits the human body through .... system.
- 10. Inside the lungs, the .... end with little air sacs known as ....
- 11. During inhalation, air travels down from your throat to your lungs through ....
- 12. At the base of your ribs, there is a large muscle that plays an important role i respiration process known as ....
- 13. During inhalation process, the diaphragm contracts and moves ...., while during exhalation process, the diaphragm expands and moves .... *(Menofia 202*

6 Give reasons for :

1. The human body is made up of different systems.

....

2. The importance of juices of liver and pancreas.

....

3. Anus is an important organ in the digestive system.

....

4. The inhaled air differs from the exhaled air.

....

5. Diaphragm plays an important role in respiration process.

....

....

7 What happens if … ?

1. The small intestine is removed from the human body.

....

2. The nutrients absorbed by the walls of small intestine enter the tiny blood vessels.

....

3. The diaphragm moves downward during inhalation.

....

....

4. The diaphragm moves upward during exhalation.

....

....

8 Cross out the odd word :

1. Saliva – Stomach – Esophagus – Small intestine. (....................)
2. Mouth – Lungs – Stomach – Large intestine. (....................)
3. Nose – Throat – Trachea – Anus. (....................)

9 Using the following table, mention the name of the tube-shaped organs of th digestive and respiratory systems inside our bodies :

(A)	(B)
Organ (1)	through which food passes to the stomach.
Organ (2)	in which the absorption of nutrients takes place.
Organ (3)	it ends with anus.
Organ (4)	it connects the throat with the two lungs.

10 Compare between :

Points of comparison	Inhalation	Exhalation
1. Diaphragm movement :	....	....
2. Size of chest cavity :	....	....
3. The air is rich in :	.... gas.	.... ga

11 Put (✓) in front of the name of the system to which each of the following organs belongs :

The organ	The system	
	Digestive	Respiratory
1. Trachea	....	....
2. Anus	....	....
3. Stomach	....	....
4. Lungs	....	....
5. Small intestine	....	....
6. Esophagus	....	....
7. Diaphragm	....	....
8. Nose	....	....
9. Large intestine	....	....
10. Liver	....	....
11. Pancreas	....	....

12 **Look at the following figure which represents the human digestive system, then mention the name of each organ and complete the sentences below :**

1. ....
   - It has .... that moistens the food.

2. ....
   - It is a tube that moves the food down into ....

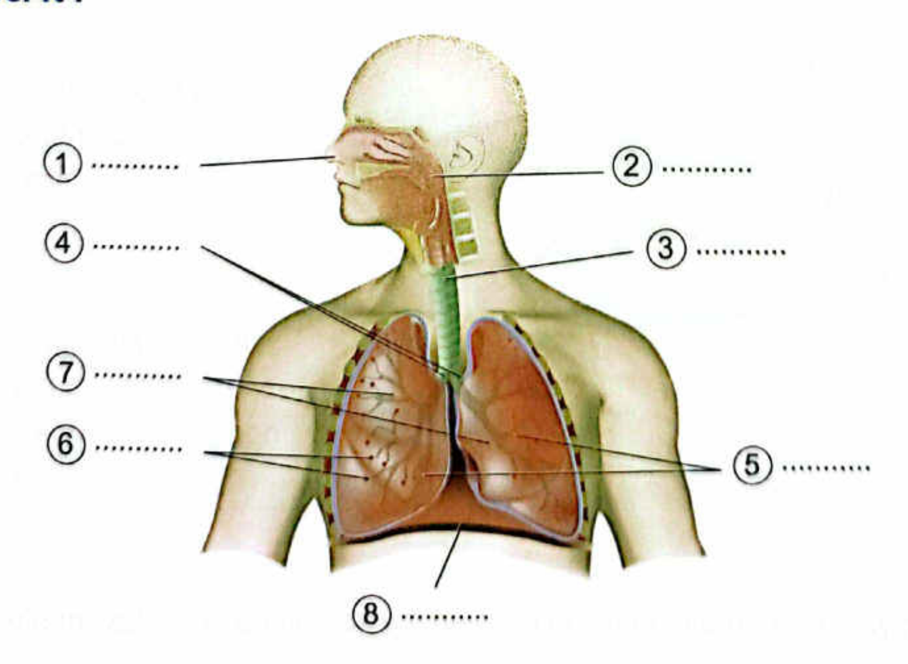
3. ....
   - It mixes food with the .... acid and .... juices.

4. ....
   - It receives juices from .... and ...., which help to break down food into ....

5. ....
   - It absorbs .... from .... food.

6. ....
   - It helps the body to get rid of solid ....

13 **Look at the following figure which represents the human respiratory system, then label it :**



14 Look at the opposite figures, then answer the questions below : (Behira 2

(1) Which figure represents inhalation ? (..........)

(2) Which figure represents exhalation ? (..........)

(3) In figure (a), ... muscle contracts and the size of chest ....

(4) In figure (b), the air that comes out is rich in .... gas .

Figure (a) Figure (b)

LESSON 5

Activity 12 How Fish Breathe

▸ **Look at the following pictures, then put (✓) or (×) :**





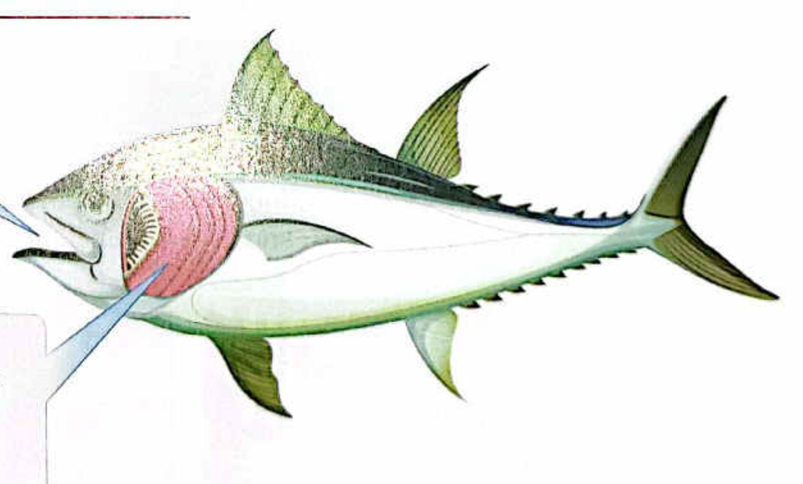
1. Human can stay and breathe under water all the time. (   )
2. Fish can stay and breathe under water all the time. (   )

Structural adaptation of fish :

- Unlike human, fish don't breathe using lungs, but they have gills to breathe.
- Gills are considered as unique structural adaptation that allow fish to live and breathe under water.
- Gills are found on both sides of a fish's head.

How do fish breathe under water ?

Water enters the mouth of the fish and passes across the gills.



Blood vessels inside the gills carry oxygen gas to the rest of the body and release carbon dioxide gas.



Note

Fish need clean water to survive, as we need to breathe clean air to stay healthy.

gills	الخياشيم	unique	فريدة	release	يطلق



Check your understanding

▶ Compare between the human respiratory system and the fish respiratory system using these words :

(carbon dioxide - blood - oxygen - air - lungs - water - gills)

Points of comparison	The human respiratory system	The fish respiratory system
Similarities :	- Inhale .... gas. - Exhale .... gas. - .... carries oxygen gas to all the body parts.	
Differences :	- Humans have .... to inhale oxygen gas from	- Fish have .... to inhale oxygen gas from ....

▶ Put (✓) or (✗) :

1. The importance of gills to fish is like that of lungs to human. (
2. Oxygen gas reaches all parts of the fish's body through the blood vessels present in its gills. (
3. Carbon dioxide gas is harmful for both fish and human. (
4. The type of adaptation in fish's gills is considered as behavioral adaptation. (

similarities تشابه differences

Activity 13 Humans Change the Environment

- Human activities cause changes or impacts in the ecosystem over time, so organisms will have to adapt these changes to survive.

Types of environmental changes

Slow changes	Rapid changes
These changes lead to : - Organisms will be able to adapt over time to survive.	**These changes lead to :** - Moving some organisms from one habitat to another, in which they can live and survive. - Disappearance and death of some living organisms. - Extinction of some living organisms.

▸ **Environmental changes may occur as a result of :**

1. Natural changes.
2. Human activities.

1. Natural changes, such as :



① Change in temperature.



② Change in the amount of rainfall during seasons.



③ Extreme weather conditions, such as strong winds.



④ Wildfires.



⑤ Floods.

impacts	تأثيرات	human activities	أنشطة الإنسان	natural changes	تغيرات طبيعية
disappearance	اختفاء	floods	فيضانات	wildfires	حرائق الغابات
extinction	إنقراض				



Note

Wildfires and floods change the nature of plants that are available for food causing increases or decreases in predators and prey populations.

2. Human activities, such as :



1. Cutting down forests.



2. Farming and clearing lands.



3. Building communities instead of grasslands.



4. Introducing plants and animals into the environment that were never part of the ecosystem.



5. **Air pollution** that is caused due to the exhausts from cars and some factories.



6. **Water pollution** that is caused due to bad habi such as throwing waste materials to waterways and soil.



Note

Changes resulted from human activities can cause the disappearance of plants and animals that once lived in an environment.

Give reason for ...

Although the air, water and soil get polluted as a result of human activities, plants and animals can survive.

Because :

- Some animals can survive by moving to another ecosystem to find what they need
- Plants depend on their seeds to land in a better place for them to survive and grov

farming	زراعة	waterways	الممرات المائية	pollution	
communities	المجتمعات	clearing land	تسوية الأرض	bad habits	
exhausts	عوادم	introduce	يُدخل		

- **As the human activities have negative effects on animals and plants, they also have negative effects on human such as :**



① Damage of lungs.



② Asthma (breathing difficulty).



③ Heart diseases.

Notes

1. Water pollution makes the human hard to find clean drinking water.
2. Air, water and soil pollution make the crops cannot grow.
3. Air pollution (smog) makes the human hard to breathe.
4. People live in big cities must change their lifestyle to decrease air pollution.

The role of human to help restore ecosystem :

- **As humans can cause harmful changes, they can help restore their ecosystems by :**
  - Replanting the cleared forests.
  - Removing the pollutants of air and water.
  - Preserving plants and animals in these ecosystems.

Check your understanding

▶ Put (✓) or (✗) :

1. Wildfires and floods cause changes in some properties of an ecosystem. ( )
2. Water pollution affects fish, but doesn't affect humans and plants. ( )
3. Humans must keep air, water and soil clean. ( )

negative effects	آثار سلبية	remove	يزيل	smog	ضباب دخاني
asthma	مرض الربو	damage of lungs	تليف الرئتين	restore	يستعيد
lifestyle	نمط الحياة				

Activity 14 Record Evidence Like A Scientist

- In this concept, you have learned a lot about how different types of adaptations help plants and animals survive.
- In this activity, which will be repeated at the end of each concept, we will learn how to think like scientists to answer a question about one of the main points of this concept through four main steps :
  - **Step (1) : The Question.**
  - **Step (2) : My Claim.**
  - **Step (3) : My Evidence.**
  - **Step (4) : My Scientific Explanation.**

Step 1 The Question

How do different types of animals and plants adapt to survive in extreme climate ?

Step 2 My Claim

Animals and plants have the ability to change their bodies structures and behaviors to adapt the extreme climate to survive in their environments.

Note
Your claim should be formed of a sentence that gives an answer for the previous question in step (1).

Step 3 My Evidence

- **Examples of structural adaptations :**
  - Some animals have thick fur to keep their bodies warm, while some other animals have extra-long ears to keep their bodies cool.
  - Some plants have tiny leaves to hold in water.
- **Examples of behavioral adaptations :**
  - Some animals stay in burrows to keep their bodies warm or cool.

Note
You should mention enough and suitable evidence that support your claim.

evidence دليل | scientific explanation التفسير العلمي | claim افتراض

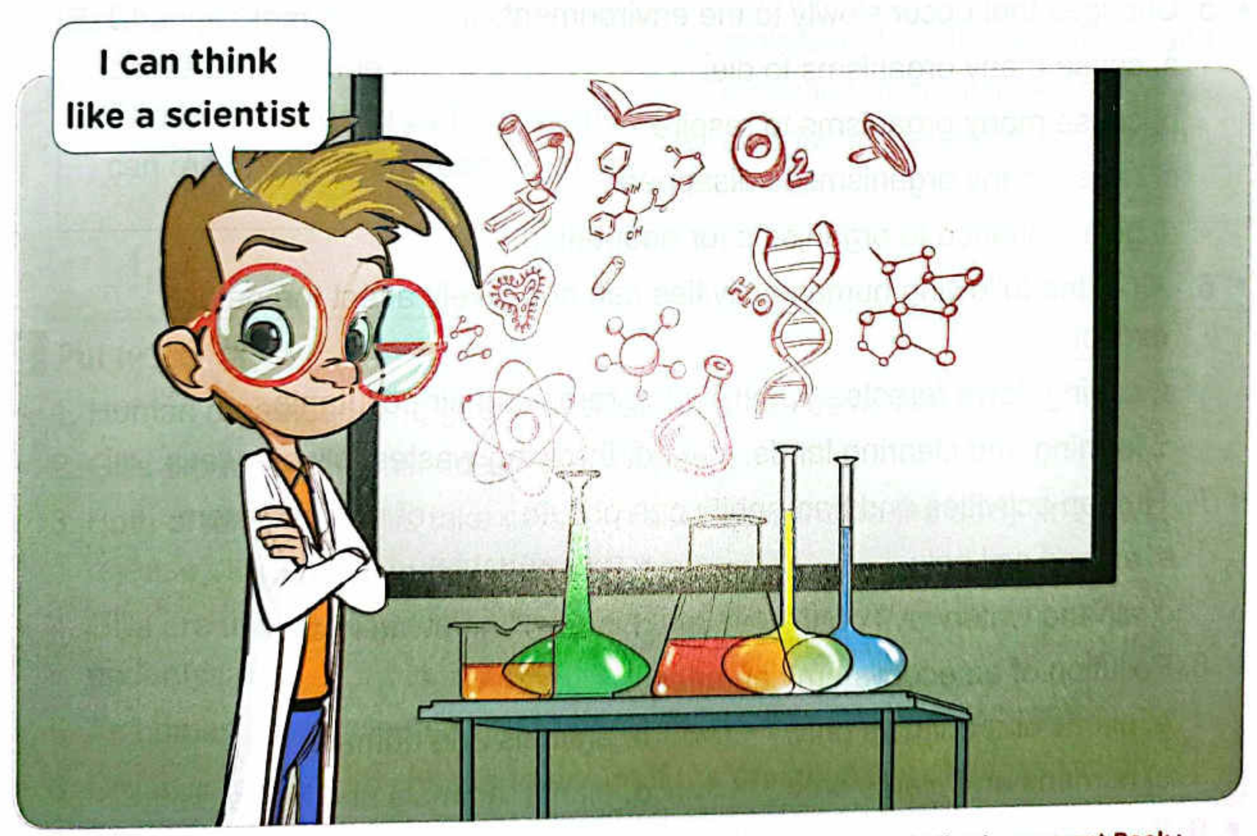
Step 4 My Scientific Explanation

Animals and plants can survive in extreme climate through structural and behavioral adaptations, where :

- The structural adaptation in the polar bears that have thick fur and penguins that have a layer of fat to adapt the cold climate in polar regions.
- The structural adaptation in fennec foxes that have extra-long ears and also the behavioral adaptation as they stay in burrows to adapt the hot climate in desert regions.
- The structural adaptation in acacia trees that have tiny leaves to hold in water to adapt hot climate in savannah regions.

Note

Your scientific explanation should explain your claim and evidence introducing some supportive examples from what you have learned.



In the Assessment Book :

Try to answer :
Self-Assessment (5)

Exercises on Lesson 5

● Understand ● Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

1. Both of human and fish ....
   a. can breathe in air.
   b. can breathe in water.
   c. use oxygen gas to breathe in.
   d. use carbon dioxide gas to breathe in.
   (Sohag 2

2. Fish use .... to breathe in water.
   a. tail
   b. eyes
   c. lungs
   d. gills

3. Gills differ from lungs, in that gills ....
   a. take in oxygen gas.
   b. expel out carbon dioxide gas.
   c. extract oxygen gas from water.
   d. extract oxygen gas from air.

4. Gills in fish are considered as ....
   a. behavioral adaptation.
   b. structural adaptation.
   c. camouflage adaptation.
   d. behavioral and structural adaptations.

5. Changes that occur slowly to the environment, ...
   a. cause many organisms to die.
   b. cause many organisms to respire.
   c. cause many organisms to disappear.
   d. give a chance to organisms for adaptation.

6. All of the following human activities can negatively affect the nature, except ....
   a. cutting down forests.
   b. removing air pollutants.
   c. farming and clearing lands.
   d. throwing wastes in waterways.

7. Human activities and bad habits can pollute .... of an ecosystem.
   a. air and soil only
   b. soil and waterways only
   c. air and waterways only
   d. air, soil and waterways

8. Pollution of an ecosystem can affect ....
   a. plants and animals only.
   b. animals and humans only.
   c. humans and plants only.
   d. plants, animals and humans.

9. If the environment is slowly changed, plants .... to survive and grow.
   a. must have a taproot
   b. must have buttress roots
   c. must decrease their adaptation
   d. must land their seeds in another better place

10. From the negative effects of human activities on the human health are ....
   a. lung damage and asthma.
   b. asthma and wounds.
   c. heart problems and wounds.
   d. lung damage and wounds. *(Qalyoubia 2022)*

11. Human can help restoring ecosystem by all of the following activities, except ....
   a. replanting the cleared forests.
   b. removing air and water pollutants.
   c. producing more factories exhausts.
   d. preserving existed plants and animals.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Changes that done by human and may harm existed birds in an ecosystem are	a. building more factories that produce more smog inside cities.
2. Changes that done by human and cause air pollution are	b. rainfall, floods and severe weather events.
3. Changes that done by human and can restore air in an ecosystem are	c. replanting the cleared forests and removing of air pollutants.
	d. clearing lands and cutting down forests.

1. .... 2. .... 3. ....

3 Put (✓) or (✗) :

1. Human breathes using gills, while fish breathes using lungs. ( )
2. Gills are found on one side of a fish's head. ( )
3. Both of lungs and gills take carbon dioxide gas inside the body and release oxygen gas outside the body. ( )
4. Gills are unique structural adaptation that allow fish to live and breathe under water. ( )
5. As human needs clean water to drink, fish needs clean air to breathe. ( )
6. Organisms have no chance to adapt, if the environment changes rapidly. ( )
7. When an ecosystem is slowly changed, many organisms may die or even become extincted. ( )
8. Cutting down rainforests may cause disappearance of starred agama. ( )
9. Wildfires and floods are natural changes that may occur to an ecosystem. ( )

10. Throwing waste materials in waterways is one of the bad habits that must be stopped. (
11. The way of survival of animals differ from that of plants, if the ecosystem is rapidly changed. (
12. Pollution is one of the most dangerous problems that affect all living organisms. (
13. Respiratory problems like lung damage and asthma occur when water pollution is high over a long period of time. (
14. Humans can restore ecosystem as well as they can harm it. (
15. When the pollution level in a city is very high, people are forced to change their lifestyle. (

4 Correct the underlined words :

1. Fish use gills to take carbon dioxide gas out of the water. *(Menofia 2022)* (..............
2. Air enters the mouth of a fish and then passes across the gills. (..............
3. Blood vessels of lungs and gills are similar in carrying carbon dioxide gas to all the body parts. (..............
4. Gills are unique behavioral adaptation that allow fish to breathe under water. (..............
5. If an ecosystem is slowly changed, living organisms may have no chance to survive. (..............
6. Cutting down forests is one of the natural changes that cause severe damage to the agricultural fields. (..............
7. When an ecosystem is severely polluted, animals only are affected. (..............
8. Water pollution is caused due to the smog of factories and cars. (..............

5 Write the scientific term of each of the following :

1. Structures that allow fish to breathe under water. (..............
2. A gas presents in air and water, and is very important for breathing process. *(Behira 2022)* (..............
3. A gas which the human and fish bodies must get rid of during exhalation process. (..............
4. A kind of pollution that is caused due to throwing waste materials into the waterways and soil. (..............
5. A kind of pollution that is caused due to the exhausts from cars and some factories. (..............

6 Complete the following sentences :

- 1. Humans use .... to breathe, while fish use .... to breathe.
- 2. In both human and fish, ... carries oxygen gas to all the body parts.
- 3. Gills of fish are considered as .... adaptation that allow fish to breathe under water.
- 4. Among natural changes that occur to an ecosystem are .... , ... and floods.
- 5. Human activities and bad habits can pollute .... , ... and soil of an ecosystem.
- 6. All living organisms including humans, animals and plants are affected negatively by ....
- 7. One of air pollutants that makes human hard to breathe is ....
- 8. When air pollution is very high over a long period of time, it may cause .... , ... and heart diseases to humans.

7 Give reasons for :

- 1. Gills are unique structural adaptation in fish.

  ....

  ....

- 2. Changes that occur rapidly to the ecosystem is more dangerous for living organisms than slow changes.

  ....

  ....

- 3. Cars and factories exhausts cause breathing problems.

  ....

  ....

- 4. Sometimes people in big cities are forced to change their lifestyle.

  ....

  ....

● Understand ● Apply ● Analyze ● Evaluate ● Create

8 What happens if ... ?

1. The ecosystem is slowly changed. (according to survival of living organisms

   ....

2. The ecosystem is rapidly changed. (according to survival of living organisms

   ....

   ....

3. Human activities and bad habits increases.

   ....

4. The exhausts from cars and factories increase in big cities.

   ....

   ....

5. Water pollution increases. (for human and fish).

   ....

   ....

9 Look at the opposite figures, then answer the questions :



Figure (1)

1. The death of fish in figure (1) may happen due to ....

   a. wildfires. b. soil pollution.

   c. water pollution. d. cutting forests.



Figure (2)

2. In your opinion, the smog produced from the factories in figure (2) may cause .... in the ecosystem.

   a. increasing of air pollution

   b. decreasing of air pollution

   c. keeping the lungs of human healthy

   d. increasing the number of plants and animals

LESSON



Activity 15     in Action

▸ **Look at the following pictures, then put (✓) or (×) :**







1. Humans and fish have the same organs to take in oxygen from air or water. (   )
2. Humans and frogs can live on land. (   )

Careers and adaptation :

- Through researches, scientists can learn how different organisms adapt to their environments and help **endangered species** survive.
- In this lesson, we are going to study **amphibians** which are one of the most amazing living organisms on Earth.

Amphibians :

- They are small animals that live on **land** and in **water** such as :

Frogs

Toads



Salamanders



- They can live in moist (wet) environments like **rainforests**, **water streams** and **ponds**.
- Like humans, adult amphibians can breathe using **lungs** when they are on **land**, but amphibians can also take in oxygen from water.

careers	وظائف	amphibians	برمائيات	researches	أبحاث
endangered species	الأنواع المهددة بالإنقراض	adult	بالغ	pond	بركة ماء

Structural adaptation of amphibians to live in wet environments :


Golden frog

- Amphibians breathe in (respire) through their **lungs** and **skin** to adapt to live on land and in water as follows :

Breathe in through lungs	Breathe in through skin
• On land, amphibians inhale oxygen gas from air through their lungs.	• The bodies of amphibians are covered with skin that allows water and gases to pass through, so they can absorb (extract) oxygen directl from water.

- **Amphibians need clean water and air to stay healthy, because they are ver sensitive to the effects of :**
  - Water pollution.
  - Air pollution.
  - Viruses that can travel through water.

The role of scientists to protect many types of amphibians from extincti

- **Scientists (biologists) are working to save many types of amphibians from extinction by studying :**
  - How amphibians breathe in air and water.
  - Factors cause air and water pollutions that affect the life of amphibians.
  - What make these animals sick in their environments.

How do people help in protection of amphibians from extinction ?

- **Clean air and water are important for amphibians, so people should :**
  - Avoid throwing waste materials in water.
  - Dispose of chemicals in a correct way helps to avoid water pollution.

skin	جلد	protection	حماية	sick	
sensitive	حساس	golden frog	الضفدع الذهبى	dispose of	
biologists	علماء الأحياء	viruses	فيروسات		



Note

Ninety species of amphibians have become extinct in the last 20 years in addition to 124 other endangered species.



Check your understanding

In your opinion, which of these sentences is correct and which one is incorrect to protect amphibians from pollution that may cause extinction ?

The sentences	Correct (✔)	Incorrect (✗)
• Cutting down trees to use their wood to make furniture.		
• Throwing chemicals into the water.		
• Operating factories in proper ways to decrease the amount of smog.		
• Avoid throwing waste materials into the water.		

extinct	ينقرض	in addition to	بالإضافة إلى
furniture	أثاث المنزل	operate	يُشغل

Activity 16 Review : Adaptation and Survival

▶ **We can summarize this concept in the following main points :**

Adaptations :

They are characteristics that help living organisms to survive and reproduce i the ecosystem which they live.

Camouflage :

It is a type of adaptation that some animals use to hide from their predators o their preys by blending in with the surrounding environments.

Examples of some animals that make adaptation to survive in their environments through camouflage :

1. **Polar bear :**
   - It lives in arctic region.
   - It has white and thick fur.
2. **Brown bear and black bear :**
   - They live in forests.
   - They have dark fur.
3. **Caracal and fennec fox :**
   - They live in desert.
   - They have sandy-colored fur.
4. **Some desert lizards :**
   - They live in desert.
   - They have colorful scales.

Types of adaptations :

1. **Structural adaptation :**
   It is a change in the structure of a living organism to survive.
   Example : The blood vessels in the penguin's feet.

2. **Behavioral adaptation :**
   It is a change in the behaviors or acts of a living organism to survive.
   Example : Desert lizard looks for shade during hot sunny days.

Plants can make adaptation to survive in their environments such as :

- **Acacia tree** in Southern African Savannah, it has a very long taproot that grows directly downward to search for water below the soil surface, a very long trunk ar tiny leaves.
- **Kapok tree** in Amazon rainforest of Brazil has buttress roots that are not planted deeply in the ground, but they grow high up on its trunk to hold the tree firmely in the soggy soil and hand-shaped leaves with narrow parts.

Some animals and their structural and behavioral adaptations :

Animal	Structural adaptation	Behavioral adaptation
• **Fennec fox :** (lives in hot dry desert).	• It has a tan-colored coat. • It has extra-large ears.	• It pants like dogs. • It lives in burrows. • It eats all kinds of food.
• **Arctic fox :** (lives in tundra desert).	• It has a thick fur coat. • Its fur coat is white during winter but turns brown in summer. • It has short ears and legs.	• It lives in burrows • It eats all kinds of food.
• **Bull shark :** (lives in fresh water and salt water).	• It uses countershading feature, in which the upper surface of its body is darker than its lower surface.	• It eats different types of food. • It hunts during the day and at night.
• **Panther chameleon :** (lives in tropical rainforest).	• Its eyes can face opposite directions and move independently. • It has brightly colored scales. • It has V-shaped feet and tail like a hand.	• It puffs up its body with air. • It opens its mouth wide. • It changes the colors of its scales.

System :

It is a group of organs that work together to perform a specific job.

• **The digestive system** breaks down food into smaller parts that your body can use.

Digestion process :

It is a process of breaking down food into smaller parts that the body cells absorb and use them to get energy and growth.

- **Digestive system of human consists of :**
  1. Mouth.
  2. Throat (pharynx).
  3. Esophagus.
  4. Stomach.
  5. Small intestine.
  6. Large intestine.

- **Respiratory system** is the system responsible for breathing.

Respiration process :

It is a process of pulling air in (inhalation) and pushing air out (exhalation) of the body.

- **Respiratory system of human consists of :**
  1. Nose.
  2. Throat (pharynx).
  3. Trachea.
  4. Two bronchi.
  5. Two lungs.
  6. Diaphragm.

- **Respiration process includes :**
  1. Inhalation.
  2. Exhalation.

- Living organisms breathe in oxygen gas and breathe out carbon dioxide gas.
- Humans have lungs to inhale oxygen gas from air to adapt to live on land.
- Fish have gills to inhale oxygen gas from water to adapt to live under water.
- Amphibians respire through lungs and skin to adapt to live on land and in water.
- We have to keep air, water and soil clear, in order to protect living organisms from extinction.

In the Assessment Book :
Try to answer :
- Self-Assessment (6)
- Model Exam on Concept (1.1)

1 Choose the correct answer :

1. Amphibians are adapted to live in .... that suits their adaptation.
   a. dry environment
   b. moist environment
   c. arctic environment
   d. sandy environment
2. Starred agama and salamander, ...
   a. both are reptiles.
   b. both are amphibians.
   c. the first is a reptile, while the second is a amphibian.
   d. the first is amphibian, while the second is reptile.
3. If amphibians have gills and they don't have lungs and also cannot respire through skin, then ....
   a. they cannot live outside water.
   b. they can live outside water.
   c. they cannot live under water.
   d. they can live in desert landscapes.
4. Amphibians can take in oxygen gas from ....
   a. water only.
   b. air only.
   c. food and air.
   d. water and air.
5. In rainforests, we can find ....
   a. panther chameleon and arctic foxes.
   b. amphibians and fennec foxes.
   c. arctic foxes and fennec foxes.
   d. panther chameleon and amphibians.
6. If the number of an animal species becomes zero due to severe changes in its natural habitat, this means that this species ....
   a. becomes endangered.
   b. becomes extinct.
   c. will survive.
   d. going to be extinct.
7. Both humans and amphibians breathe in oxygen. Which of the following sentences is correct ? ....
   a. Both can breathe in oxygen gas through lungs.
   b. Both can take in oxygen gas through skin.
   c. Humans can breathe in oxygen gas from water and air.
   d. Amphibians can breathe in oxygen gas through gills.

8. Blood vessels that carry oxygen gas in amphibians, present in ....
   a. skin and digestive system.
   b. lungs and eyes.
   c. digestive system and eyes.
   d. skin and lungs.
9. Amphibians, lizards, trees, birds, fish and humans ....
   a. some of them need oxygen gas to respire.
   b. some of them need carbon dioxide gas to respire.
   c. all of them need oxygen gas to respire.
   d. all of them need carbon dioxide gas to respire.
10. If a pond where some frogs live is highly polluted with wastes and viruses. What you have to do to preserve these frogs ? ....
    a. Fill in the pond with sand.
    b. Dry this pond from water.
    c. Supply this pond with more oxygen gas.
    d. Transfer these frogs to a clean water habitat.

2 Put (✓) or (✗) :

1. Amphibians include frogs and salamanders. ( )
2. The natural habitat of amphibians is rainforest, while that of panther chameleon is desert. ( )
3. The number of amphibians increases in the last few years, due to restoring of its ecosystem. ( )
4. Arctic foxes and amphibians cannot found in the same habitat. ( )
5. Salamanders and fish can breathe in air through lungs. ( )
6. In the habitat of amphibians, we can find some types of reptiles. ( )
7. Scientists try to save golden frogs from extinction. ( )
8. Clean water and air are very important for respiration process in amphibians. ( )
9. It is important to advice people not to throw waste materials in waterways to save amphibians' life. ( )

3 Write the scientific term of each of the following :

1. Species that include frogs, toads and salamanders. (..................)
2. The organ through which salamanders can take in oxygen gas directly from water. (..................)
3. A gas presents in water and air that living organisms breathe in during respiration. *(Cairo 2022)* (..................)
4. The type of adaptation that allows frog to take in oxygen gas from water directly through the skin. (..................)
5. A respiratory organ that contains little sacs, and found in humans, frogs and cows but not in fish. (..................)

4 Complete the following sentences :

1. Starred agama lizard is a ...., while frog is an ....
2. Humans, amphibians and reptiles have .... to breathe in oxygen gas from air.
3. Bull shark can respire through .... only, while salamander can respire through .... and ....
4. Both humans and adult amphibians have no .... that is present in fish for respiration.
5. As the pollution rate of water in ponds and air increases, the number of amphibians ....
6. Amphibians have two ways to breathe in oxygen, one from air through .... and the other from water through ....
7. The ability of amphibians to take in oxygen gas from water through the skin, is considered as .... adaptation.
8. All living organisms breathe in oxygen gas and gives out .... as a waste product.
9. Pollution of .... and .... may cause a big problem on the amphibians survival.

5 Correct the underlined words :

1. Fish can breathe only in <u>air</u>. (..................)
2. Amphibians live in <u>dry</u> environments. (..................)
3. Starred agama is a reptile, while frog is <u>a lizard</u>. (..................)
4. Amphibians have <u>gills</u> as well as humans for respiration. (..................)

Understand Apply Analyze Evaluate Create

5. Amphibians can take in carbon dioxide gas from air for respiration. (..........)
6. In rainforests, we can find panther chameleon and arctic fox. (..........)
7. Reptiles have two different ways for breathing. (..........)
8. Humans and frogs can breathe in oxygen gas in water. (..........)

6 Give reasons for :

1. Skin of fish is different from that of frog, although both of them live in water.

....

....

2. Dry seasons is very harmful for amphibians.

....

....

3. Pollution of air and water can affect the survival of amphibians.

....

4. Scientists must study how amphibians interact with their environments.

....

7 What happens if ... ?

1. Pollution level increases in the natural habitat of amphibians.

....

2. The ecosystem of amphibians is containing clean air and water.

....

3. Amphibians don't have lungs and breathe only through skin.

....

4. The number of predators of amphibians increases.

....

....

5. Salamanders have lungs only to respire.

....

....

6. Skin of frogs becomes dry.

....

....

8 Read the following paragraph, then answer the questions :

Panda bears live in mountainous land in China, where bamboo plants grow. Panda depends on the bamboo plants in its feeding. Panda is one of the endangered animals all around the world. Cutting down bamboo plants decreases the food source of panda, and also hunting cause a great harm on panda survival.



Put (✓) in front of right statements and (x) in front of wrong ones :

1. Due to cutting down bamboo plants and hunting, number of panda bears increases. ( )
2. The body coat of panda is fur like other types of bears. ( )
3. Prevent cutting down bamboo plants and prevention of panda hunting can save panda from extinction. ( )

Model Exam on Concept (1.1)

Tota

(5

1 **(A) Choose the correct answer :**

1. Both golden frog and polar bear, ...
   a. live in the same habitat. b. can breathe in oxygen gas in water.
   c. have the same body coat. d. are living organisms.
2. The color of the body coat of arctic fox changes according to the season, this is considered as ....
   a. change of the way of breathing. b. a type of structural adaptation.
   c. change of the way of drinking. d. a type of behavioral adaptation.
3. In dry desert, most plants need .... to get water from the sandy soil.
   a. long trunk b. long roots
   c. long branches d. long leaves
4. The food moves into the stomach through the ....
   a. esophagus. b. trachea.
   c. small intestine. d. tongue.

(B) Give a reason for the following :

Gills are unique structural adaptation in fish.

....

....

(5

2 **(A) Put (✓) or (X) :**

1. Both salamander and fish can breathe in through lungs. (
2. In polar environment, the sandy-colored fur of caracal helps it blend in with snow. (
3. Panther chameleon and agama lizard can use one of their eyes for searchi for food and the other one to look out for danger. (
4. Adaptation to store water is an important character for plants that live in dry desert environment. (

(B) What happens if ... ?

The diaphragm moves upward during exhalation.

....

....

3 (A) Correct the underlined words : *(5 marks)*

1. Cutting down forests is one of the natural changes that cause severe damage to the agricultural fields. (..........................)
2. Reptiles like toads have two different ways for breathing. (..........................)
3. Fish use gills to take in carbon dioxide gas out of the water. (..........................)
4. Mangrove tree has wide leaves to absorb a large amount of sunlight. (..........................)

(B) Give only one example of behavioral adaptation in bull shark.

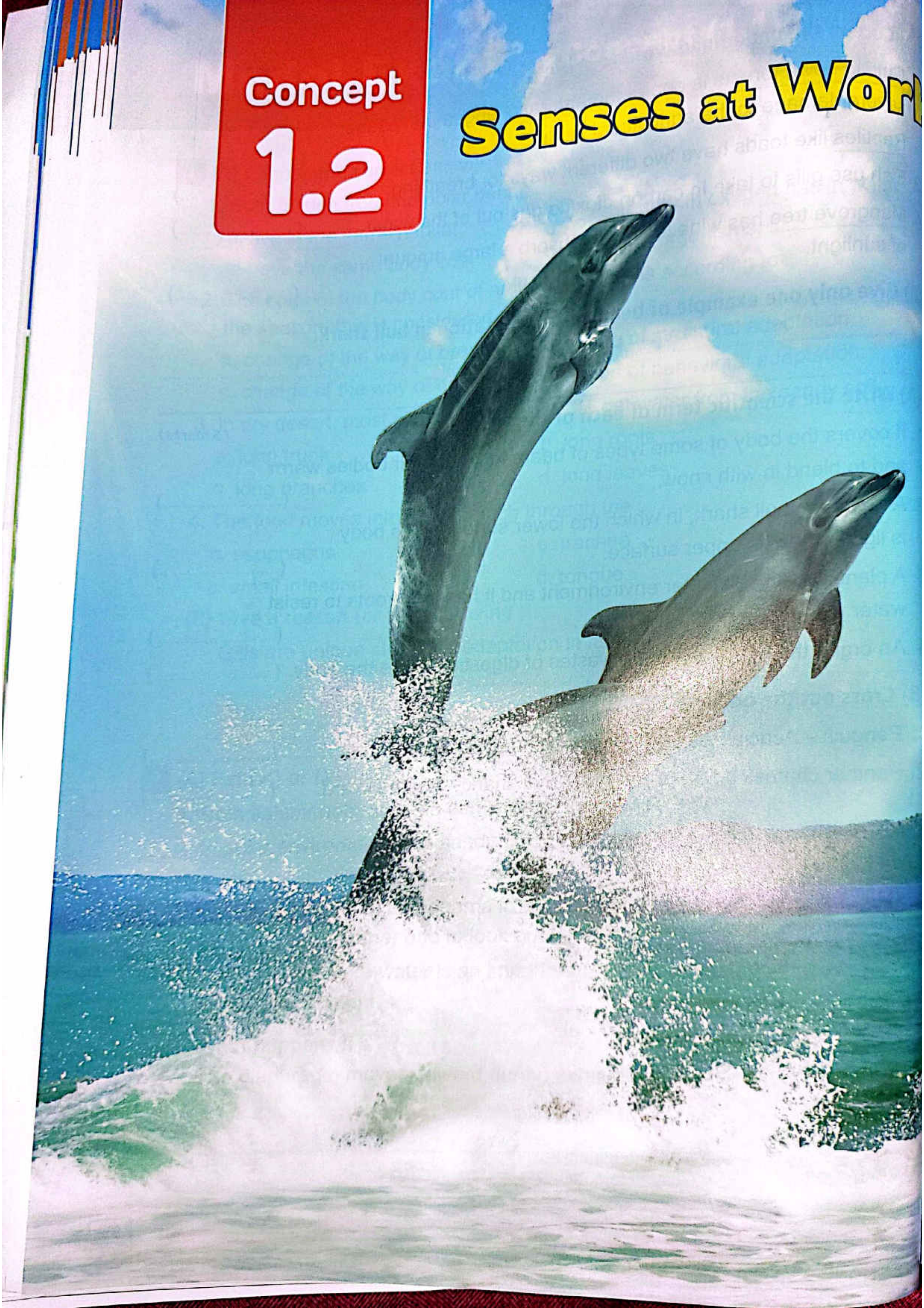
....

4 (A) Write the scientific term of each of the following : *(5 marks)*

1. It covers the body of some types of bears to keep their bodies warm and to blend in with snow. (..........................)
2. A feature in bull shark, in which the lower surface of its body is lighter than its upper surface. (..........................)
3. A plant lives in salt water environment and it has long roots to resist water waves. (..........................)
4. An organ through which solid wastes of digestion leave the body. (..........................)

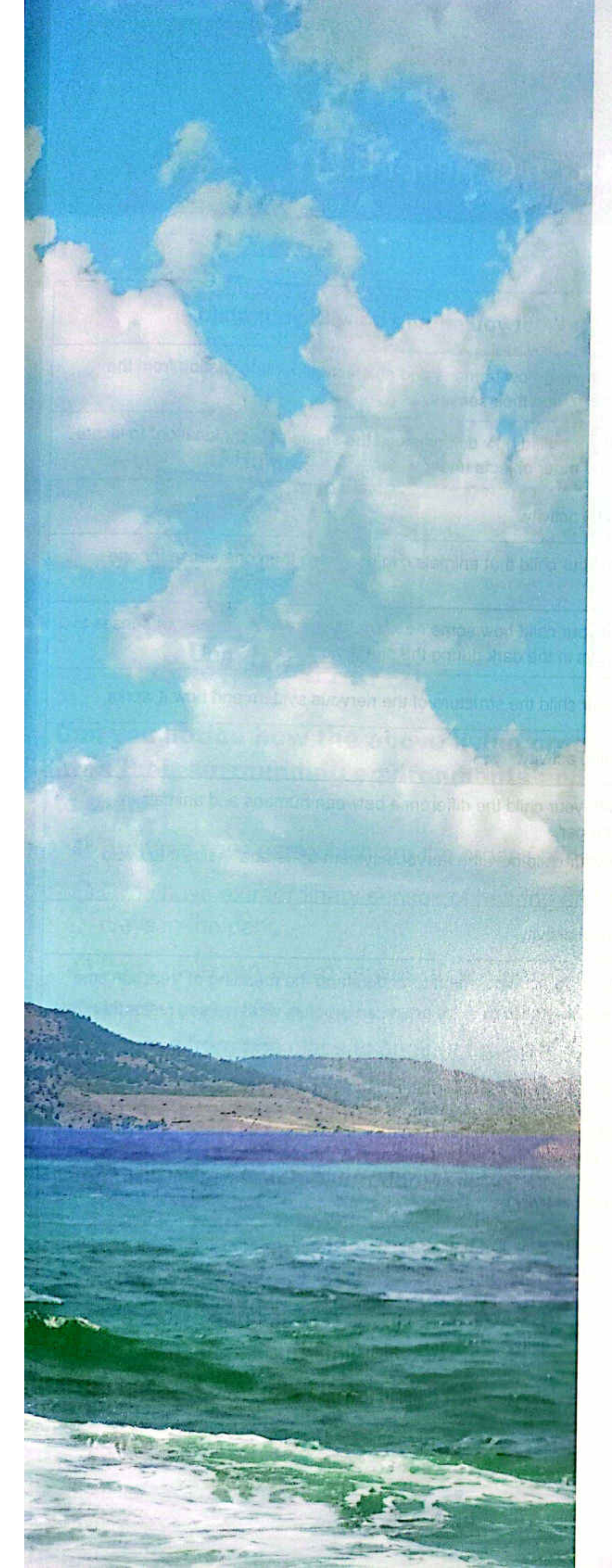
(B) Cross out the odd word :

1. Penguin – Acacia tree – Pine tree – Polar bear. (..........................)
2. Panther chameleon – Fennec fox – Bull shark – Agama lizard. (..........................)



Concept 1.2

Senses at Work



Learning outcomes

By the end of this concept, your child will be able to :

- Develop models illustrating how animals receive, process and react to information in their environments.
- Explain how organs and systems work together to process and respond to input from the senses.
- Plan and carry out investigations to produce evidence that the senses play a role in reaction time.

Key vocabulary
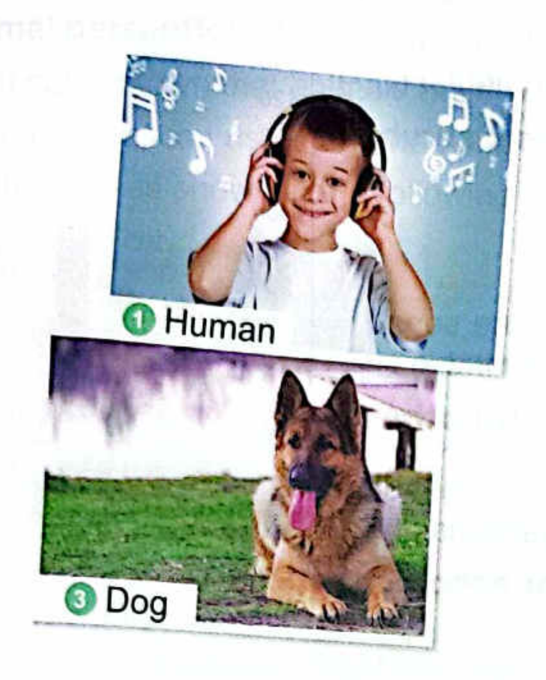
- Brain
- Reflex
- Sound
- Nerve
- Receptor
- Senses
- Information

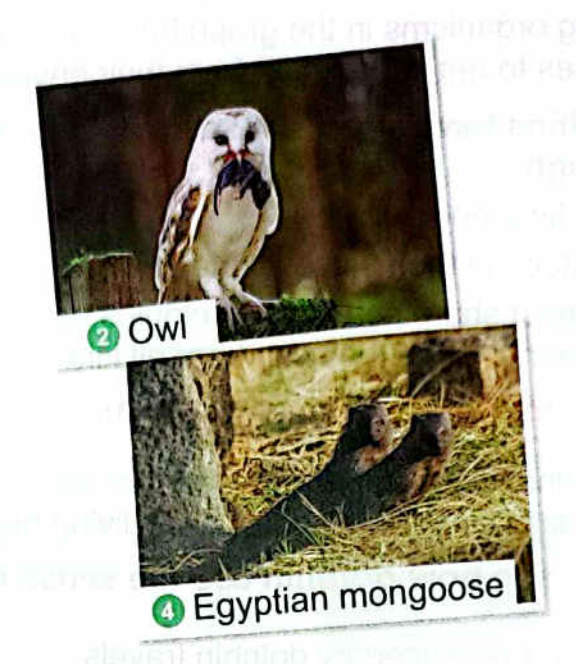
Notes For Parents On Concept [1.2]

Lessons	Activities	What you should do with your child
1	Activity 1	Explain to your child how humans and animals gather information from the environment by using their senses.
	Activity 2	Discuss with your child how dolphins use the sense of "echolocation" to loc their preys and other objects under water.
	Activity 3	Optional digital activity.
	Activity 4	Discuss with your child that animals can use more than one sense for one purpose.
2	Activity 5	Discuss with your child how some nocturnal animals use their super senses hunt their preys in the dark during the nighttime.
	Activity 6	Explain to your child the structure of the nervous system and how it works.
	Activity 7	Optional digital activity.
3	Activity 8	- Discuss with your child the difference between humans and animals in avoiding danger. - Explain to your child how the nervous system of "jerboa" helps it to avoid danger.
	Activity 9	Optional digital activity.
4	Activity 10	- Let your child do an experiment to understand the meaning of "reaction tir - Discuss with your child that the brain can process what we see faster thar what we hear.
5	Activity 11	Discuss with your child the different functions of the nervous system.
	Activity 12	Let your child answer some questions about the nervous system and its functions to check his/her understanding.
	Activity 13	Optional digital activity.
6	Activity 14	Help your child to think like a scientist by answering a question about one of main points of this concept then write his/her claim, evidence and the scienti explanation.
	Activity 15	Optional digital activity.
	Activity 16	Let your child review the main points in this concept.

LESSON 1

Activity 1 Can You Explain ?





Can you notice how the above living organisms receive information from their surrounding environments and how they are responding to them ?

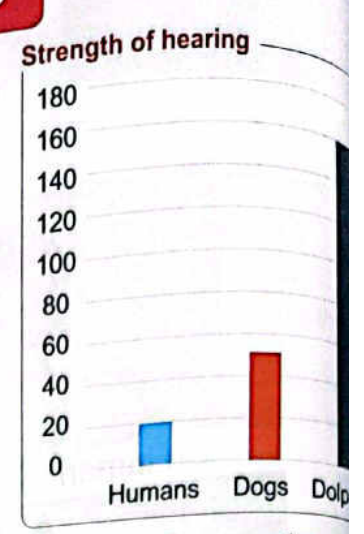
1. **Humans** have ears which are the organs of hearing to listen music.
2. **Owls** have extraordinary senses of hearing and sight to be able to find their preys in the dark.
3. **Dogs** have very sharp senses of hearing and smell, which are used in guarding.
4. **The Egyptian mongoose** makes sounds to communicate with other mongooses to move from one place to another or when searching for food.

▸ **From the previous explanation we conclude that :**
Animals have senses like humans that enable them to communicate with each other and adapt to their surrounding environments.

▸ **In this concept, we will study :**
- Dolphin super senses.
- How the five senses work.
- Super senses of some animals.
- The nervous system and how it works.

extraordinary	أستثنائى	Egyptian mongoose	النمس المصرى	guarding	حراسة

Activity 2 Dolphin Super Senses



▸ **Look at the opposite graph, then put (✓) or (✗) :**

Living organisms in the graph have similar hearing senses to get information from their environments. (   )

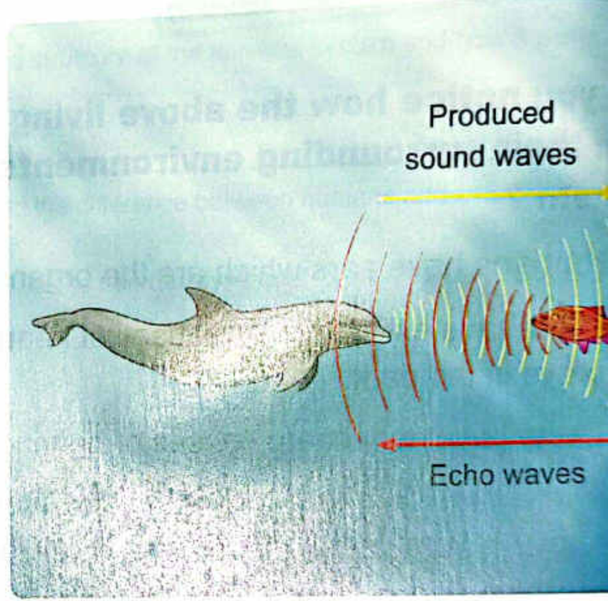
- **Dolphins have super senses that help them survive through :**
  - Finding food.
  - Protecting themselves under water.
- The most sharp sense that dolphins have is the sense of hearing, since they can hear all kinds of sound.

How can dolphins locate organisms and other things under water ?

Dolphins use a sense known as "echolocation" that depends on **"echo"** to determine the location of other living organisms and objects in the water.

▸ **Let's see how dolphin use the sense of echolocation :**

1. Sound produced by dolphin travels in the form of waves called sound waves.
2. These waves travel through water and when they hit objects, they bounce back to the dolphin in the form of echo.
3. Echo helps the dolphin determine the location of prey and other objects.





Check your understanding

▸ **Put (✓) or (✗) :**

1. Smell is one of the super senses of dolphins. (   )
2. Echo helps dolphins locate their preys. (   )





Optional Digital Activity

Activity 3 " Using Our Five Senses " in the school book is an optional digital activit[y]. You can do this activity by scanning its QR code found in your school book.

super senses	الحواس الفائقة	echolocation	تحديد الموقع بالصدى	hit
survive	يتعايش	echo	صدى	bounce
locate	يحدد مكان	waves	موجات	

Activity 4

What Do You Already Know About Senses at Work ?

- **Animal perceptions :**
  - You have known that animals have senses like those of humans.
  - Each animal can use more than one sense for more than one purpose to adapt to its habitat, as shown in the following examples :

Fox



- **The purpose :** Avoiding danger.
- **The used senses :** Hearing and sight.

Chameleon



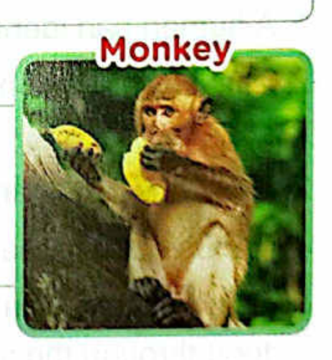
- **The purpose :** Finding food.
- **The used senses :** Sight and taste.

Dog



- **The purpose :** Recognizing friends.
- **The used senses :** Smell and sight.

Monkey



- **The purpose :** Identifying objects.
- **The used senses :** Touch, smell, sight, taste and hearing.



Check your understanding

- **Put (✓) or (✗) :**

1. The owl can search for food using its sight sense. ( )
2. The cat can avoid danger using its taste sense. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (7)

Exercises on Lesson 1

● Understand ● Apply ● Analyze ● Evaluate ● Cre...

1 Choose the correct answer :

- 1. The sensory organs of a dolphin help it do all of the following, except ....
  a. surviving. b. finding food.
  c. finding water. d. protecting itself under water.
- 2. The five senses of humans and animals are ....
  a. sight, hearing, touch, smell, and movement.
  b. sight, movement, taste, touch, and smell.
  c. taste, touch, movement, hearing, and smell.
  d. sight, hearing, taste, smell, and touch.
- 3. To know if a cup of water is hot or cold, we need to use the sense of ....
  a. sight. b. hearing. c. smell. d. touch.
- 4. We can distinguish between water and milk through ....
  a. taste and hearing. b. sight and hearing.
  c. smell and hearing. d. taste and sight.
- 5. If there is some salt in a dish and some sugar in another dish, you can distinguish between them through the sense of ....
  a. smell. b. taste. c. touch. d. hearing.

2 Put (✓) or (✗) :

- 1. A human can identify music through ears which are the organs of sight. (
- 2. The Egyptian mongoose can communicate with its species by making sounds. (
- 3. The sense of hearing of dolphins is stronger than that of human. (
- 4. We use our sense of smell to identify the color of a flower. (
- 5. Skin helps human distinguish between the taste of different types of food through the sense of touch. (
- 6. Chameleon uses its tongue to taste food. (

3 Write the scientific term of each of the following :

- 1. The property that depends on the sense of hearing through which dolphins locate their preys under water. (..........
- 2. The organ used to recognize different colors. (..........
- 3. The organ used to recognize different odors. (..........
- 4. The sense used to differentiate between smooth and rough surfaces. (..........

4 Complete the following sentences :

1. The dog uses the senses of .... and .... in guarding.
2. A human can pay attention to an alarm bell in case of danger through the sense of ....
3. Dolphins have sharp sense of ...., which they use to locate living organisms under water through the ....
4. We can identify the odor of flowers using the .... sense.

5 Correct the underlined words :

1. The dolphin has sharp sense of touch. (..............)
2. The fox uses its tail and ears to run away when it sees or hears its enemies. (..............)
3. The dog uses its eyes to recognize odor of humans. (..............)

6 Give reasons for :

1. The Egyptian mongoose make sounds.

....

....

2. Owls can hunt during the night.

....

....

3. Dogs are used in guarding.

....

4. Dolphins can hear all kinds of sound.

....

7 What happens when the sound waves produced by a dolphin hit an object under water ?

....

....

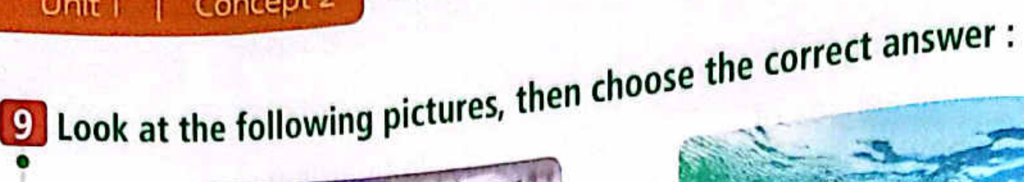
8 Arrange the following steps to illustrate how dolphins use their sharp hearing to catch preys :

(..............) The sound waves travel and hit the prey, then bounce back to the dolphin in the form of an echo.

(..............) The echo helps the dolphin locate its prey.

(..............) The sound produced by a dolphin is transmitted in the form of waves called sound waves.

● Understand ● Apply ● Analyze ● Evaluate ● Create



9 **Look at the following pictures, then choose the correct answer :**



Animal (1)



Animal (2)

1. The sharpest senses that animal (1) has are ....
   a. touch and smell. b. smell and hearing.
   c. taste and sight. d. hearing and taste.
2. Animal (1) uses one or both of its sharpest senses in each of the following situations, except ....
   a. identifying friends. b. identifying food.
   c. recognizing strangers. d. tasting food.
3. The sharpest sense that animal (2) has is ....
   a. hearing. b. taste.
   c. touch. d. smell.
4. Animal (2) uses its super sense in each of the following situations, except ....
   a. locating objects under water.
   b. avoiding danger.
   c. detecting scents of living organisms under water.
   d. locating preys under water.

Activity 5 Super Senses

▶ **Look at the following pictures, then put (✓) or (×) :**





① Human can see everything clearly inside a dark room. ( )

② An owl can see its prey in the dark during nighttime. ( )

- You can hear the noise of something moving through the darkness, even you cannot see it clearly.
- Some animals can look for their food at night using their super senses, these animals that become active at night are known as " **Nocturnal animals** ".

▶ **Why do some animals become active at night ?**

1. In extremely hot places, the best time to look for food is nighttime, when it is cooler.
2. Some animals hunt food that is only available at night.
3. Some animals depend on darkness to hide from their preys and surprise them.

▶ **How can nocturnal animals hunt without much available light ?**

Super sensory adaptations of nocturnal animals allow them to navigate safely and find food in the dark, as shown in the following examples :

1. Snakes :

Snakes have the ability to sense heat of their preys' bodies using a specialized body part in their faces.



Purpose :

To locate their preys in complete darkness through sensing their body heat.

nocturnal animal حيوان ليلي navigate التنقل

2. Bats :



- Bats rely on echolocation like dolphins to find their food.
- The sound bounced back to bats help them to find their preys and move around.

Purpose :
To find insects at night because unlike dolphins, bats must hunt in the dark.

3. Owls :



- Owls have both extraordinary sight and hearing.
- Bowl-shaped faces and specialized head feathers pick up and amplify distant sounds then direct these sounds into the owls' ears.
- Owls' large eyes allow them to detect tiny and faraway movements of their preys that hide in the grass or under the snow.
- Owls have the ability to turn their heads in all directions to search for preys everywhere.

Purpose :
To detect the movements and sounds of tiny distant preys.





Check your understanding

▶ **Give a reason for :**

Bats can catch insects in the dark.

....

bowl-shaped	شكل وعاء	amplify
feathers	ريش	direct

Activity 6 **Pizza and the Nervous System**

- Senses work together with the nervous system to gather information from the environment.
- Mammals such as humans, elephants and dogs have the same structure of nervous system.

The nervous system consists of :

- **The brain.** - **The spinal cord.** - **Nerves.**

The brain

- The brain is connected to a big nerve that runs through the backbone called the spinal cord.
- The brain is connected directly to some nerves such as the nerves of the eyes and the heart.

Its function :
It is the main control center in the body.

The spinal cord

The spinal cord is branched into smaller and smaller nerves.

Its function :
It helps carry messages to and from the body and the brain.

Nerves

Nerves are distributed throughout the body and connect the sense organs and the body parts with the brain.

Their function :
They carry messages from the brain to the spinal cord and other parts of the body, as well as from other parts of the body to the spinal cord and the brain.

Human nervous system

nervous system	الجهاز العصبي	spinal cord	الحبل الشوكي	distribute	يوزع
gather	يجمع	nerves	أعصاب		
mammals	ثدييات	backbone	العمود الفقري		

Notes

1. The nerves transmit information from the sensory organs to the brain in the form of **electrical impulses**.
2. The five sensory organs contain a special type of nerves known as sensory rece

Sensory receptors :

They are nerves found in different parts of the body that are responsible for receiving information from the environment.

How does the nervous system work if you smell pizza ?

1. The sense organ (nose) receives the information from the environment which is the pizza's odor.



2. Then the sensory receptors of smell that are found in the back of your nose send specific signals along the nerves to your brain. These signals are in the form of electrical impulses.

3. Once the information about the smell reaches your brain, the brain proces that information and determines the type of the food.



Check your understanding

Choose the correct answer :

Imagine that you are touching an ice cube with your finger. Do you know whe the information is processed to tell you that it is cold ? ....

a. In your finger. b. Hand. c. Nerve.

d. Brain. e. Spinal cord.



Optional Digital Activity

Activity 7 " Processing Sensory Information " in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

In the Assessment Book :
Try to answer :
Self-Assessment (8)

electrical impulses	نبضات كهربية	sensory receptors	مستقبلات حسية
odor	رائحة	signals	

1 Choose the correct answer :

1. The senses you rely on to find a small radio that produces low sound in a dark room are ....
   a. hearing and smell.
   b. touch and taste.
   c. smell and taste.
   d. hearing and touch.
2. The brain is the main control center in the body, so it can deal with .... at the same time.
   a. two senses only
   b. three senses only
   c. four senses only
   d. all the five senses
3. Animals that become active at night are called .... *(Gharbia 2022)*
   a. diurnal animals.
   b. nocturnal animals.
   c. extinct animals.
   d. endangered animals.
4. Some animals become active during the night due to the following reasons except that ....
   a. the night is characterized by the cool weather.
   b. the night is a good time for relaxation and rest.
   c. the night is quiet, so that they can hear preys.
   d. the night is a time when preys are available.
5. A snake has the ability to catch preys at night because it can ....
   a. smell them.
   b. hear their heartbeats.
   c. see them clearly at night.
   d. sense the heat of their bodies.
6. Both bats and mosquitoes are active during night. Which of the following statements is correct ? ....
   a. Both can swim well.
   b. Both can run fast.
   c. Bats prey on mosquitoes.
   d. Mosquitoes prey on bats.
7. If a rat is found at equal distance from an owl and a snake, and the rat makes a quiet move at night, which of the following statements is correct ? ....
   a. The owl may reach it first, if it senses the rat's body heat.
   b. The snake may reach it first, if it hears the rat movement.
   c. Both of them may reach the rat at the same time because both have sharp sight.
   d. The owl may reach it first, because owls have sharp sight and hearing.
8. A snake can sense the body heat of preys at night using ....
   a. all of its body.
   b. a special part in its tail.
   c. a special part in its face.
   d. a special part in its back.

● Understand ● Apply ● Analyze ● Evaluate ● Create

• 9. Flying bats don't hit different objects at night because they can ....
a. see them clearly in darkness. b. touch them.
c. smell them. d. hear the echo reflected from them.

• 10. Owls have all the following properties to sense distant preys that make lo... sounds, except .... (Menof...
a. large eyes.
b. a bowl-shaped face.
c. a head that turns in all directions.
d. weak sense of hearing.

• 11. The owl's large eyes and bowl-shaped face are considered as .... adap...
a. only structural
b. only behavioural
c. both structural and behavioral
d. neither structural nor behavioral

(Cair...

• 12. The nervous system of mammals consists of ....
a. the brain only.
b. the spinal cord only.
c. nerves and the spinal cord only.
d. the brain, the spinal cord and nerves.

• 13. Both the spinal cord and nerves ....
a. are located in the brain.
b. are located in the small intestine.
c. transmit messages from the brain to all parts of the body only.
d. transmit messages from the brain to all parts of the body and vice versa

• 14. Which of the following choices explains how the body reacts to the smell o... food in the correct order ? ....
a. Brain ⟶ nose ⟶ nerves. b. Nose ⟶ brain ⟶ nerves.
c. Nerves ⟶ brain ⟶ nose. d. Nose ⟶ nerves ⟶ brain.

• 15. The organ that processes the information collected through the sense of s... is ....
a. the spinal cord. b. nerves.
c. the brain. d. eyes.

• 16. The correct order for a bat to locate a mosquito using echo, is ....
a. mosquito makes a sound ⟶ reaches the bat ⟶ returns to mosquito.
b. bat makes a sound ⟶ reaches a wall ⟶ returns to mosquito.
c. mosquito makes a sound ⟶ reaches a wall ⟶ returns to mosquito.
d. bat makes a sound ⟶ reaches the mosquito ⟶ returns to bat.

2 Choose from column (B) what suits it in column (A) :

- (1)

(A)	(B)
1. Bat 2. Owl 3. Snake	a. It is a flying nocturnal animal that can hear the quiet movements of rats. b. It is a nocturnal reptile that can sense the body heat of rats. c. It is a non-flying mammal. d. It is a flying nocturnal animals that sound reflected to it after hitting insects.

1. .... 2. .... 3. ....

- (2)

(A)	(B)
1. Sensory receptors 2. Nerves 3. Brain 4. Spinal cord	a. It is the main control center in the body. b. They are electrical impulses that reach the brain. c. It is found in the backbone and helps transmit messages between the body and the brain. d. They are found on the sensory organs and the first to sense the surrounding environment. e. They receive information from the sensory receptors.

1. .... 2. .... 3. .... 4. ....

3 Put (✓) or (X) :

- 1. The sensory receptors in the eyes receive the sound produced by a radio and send it to the brain. ( )
- 2. Animals that active during the daytime are called nocturnal animals. ( )
- 3. Some animals have abilities that humans do not have, and these abilities are called super sensory adaptations. ( )
- 4. The owl depends on echo to determine the location of preys within the grass or beneath the snow. ( )
- 5. A bat makes sounds that hit insects and then bounce back to it, so the bat can locate them. ( )
- 6. A snake has the ability to sense the smell of preys using a special part in its face. ( )
- 7. The spinal cord is the main control center of the body, which helps carry messages from and to the brain. ( )
- 8. The heart and eyes are connected to the brain through blood vessels that transmit information in the form of electrical impulses. ( )

9. The tongue is the sensory organ responsible for taste, which sends messag to the brain to be processed, then identifying the food type.

4 Write the scientific term of each of the following :

1. A group of different animals that look for their preys at night. (.........
2. A reptile that can sense the body heat of its preys at night using a special part in its face. (.........
3. A property by which a bat can locate its prey insects through the sound reflected from them. (.........
4. An animal that can turn its head backwards, and has a bowl-shaped face and large eyes. (.........
5. A system that controls all the body functions, and nerves are one of its parts. *(Cairo 2022)* (.........
6. The organ responsible for processing information transmitted to it, then send messages to the sensory organs. (.........
7. An organ composed of a group of nerves located in the backbone, and sends messages from and to the brain. (.........
8. Organs include the eyes, nose, ears, tongue and skin, and they receive information from the surroundings and send it to the brain. (.........
9. A type of nerves in the sensory organs that is responsible for receiving information from the environment. (.........

5 Complete the following sentences :

1. To determine places of preys at night, snakes rely on their ability to sense .... produced by the prey bodies, while bats locate their preys using a sense known as ....
2. Echolocation is used by some animals such as .... and ....
3. Owls can detect the places of their preys by using the super senses of ...... and ....
4. An owl can see everywhere by turning its .... in all directions, while a chameleon can see everywhere by moving its .... in opposite direction
5. The brain is connected to a group of nerves that passes through the backb which is known as the ....
6. Information are transmitted from the sensory organs to the brain in the form .... through nerves.
7. If you see a cat, you have received this information through the sensory receptors in your ...., then the nerves send a signal to your .... to identi

6 Correct the underlined words :

1. Tongue is the sensory organ that is responsible for <u>smelling</u> sour lemon. (....................)
2. The spinal cord passes through the <u>mouth</u>. (....................)
3. When a bat sends a sound against a wall, it returns to it. This phenomenon is called <u>camouflage</u>. (....................)
4. The organ that is responsible for receiving, processing and responding to information is the <u>heart</u>. (....................)
5. The sense of sight of owls is <u>weaker</u> than that in bats. (....................)

7 Give reasons for :

- 1. Animals that live in hot regions become active at night.

  ....

  ....

- 2. Snakes have a part in their faces that have a super ability to sense heat.

  ....

  ....

- 3. Owls have bowl-shaped faces.

  ....

  ....

- 4. Snakes can find food at night, although they cannot see well in the dark.

  ....

  ....

8 What happens if ... ?

1. A snake is injured in its face in the part that sense the heat.

   ....

   ....

2. Bats lose the ability to hear by using echolocation property.

   ....

   ....

3. Owls cannot turn their heads in all directions.

   ....

   ....

9 Look at the opposite figure, then answer the questions below :

a. What does the figure represent ?

....

b. Label the figure :

① .... ② .... ③ ....

c. **Complete :**

1. Number (..................) is found inside the backbone of the human body.
2. Number (..................) represents the main control center in the human body.
3. Number (..................) spreads all around the human body parts.

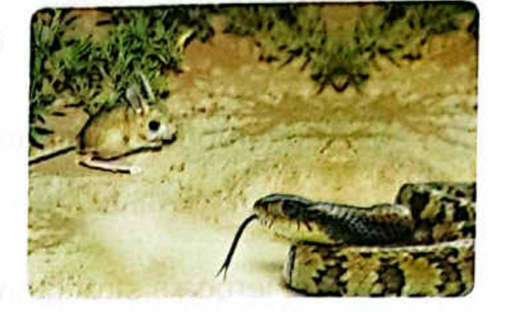
② ③

LESSON 3

Activity 8 Sensing the Environment

▶ **Look at the following picture, then choose the correct answer :**

When this small animal hears a snake moving nearby, it jumps quickly in less than one second. Which system in the human and animal body do you think is responsible for the movement of the small animal in this situation ? ....



a. Respiratory system. **b.** Nervous system.

c. Digestive system.

▶ **In this lesson, we will learn how structural adaptations (physical adaptations) and the nervous system work together to help the jerboa survive.**

Jumping jerboa :

- The Egyptian jerboa is a desert rodent.
- It searches for food at night.

▶ **Jerboa adaptations to the environment :**

Jerboa has large and sensitive ears, so it can detect even a quiet snake. (Structural adaption)



Egyptian Jerboa

- Jerboa's feet and toes have hair to help it grip the sand when it hops and jumps.
- It hops in zigzag patterns, so it can escape quickly from danger. (Behavioral adaptation)

Jerboa has long hind legs that enable it to jump a long distance. (Structural adaptation)

jerboa	حيوان اليربوع	grip	يمسك	hind	خلفية
rodent	قارض	zigzag patterns	مسارات متعرجة		

▶ How do all parts of a jerboa's body work together to avoid danger ?

When a snake makes noise as it comes near a jerboa to hunt it :

1. The sensory receptors in the jerboa's ears send a message through a network of nerves to its brain.
2. The jerboa's brain translates this message and alerts its legs to move.
3. The jerboa's strong hopping legs start to jump away from the danger (the snake) in zigzag paths .

- The jerboa's sharp sense of hearing and its strong legs for jumping work toget with its nervous system to help it survive.
- The whole response process of the jerboa running away from danger occurs i than one second. The time taken by a jerboa to react to danger is known as the "reaction time".

Reaction time :

It is the time taken by the body of a living organism to react to different informa from the environment (such as danger).

▶ How does the jerboa respond to danger compared to a human ?

- Both human and jerboa avoid danger by relying on sensory receptors, nerve a brain to sense and communicate messages.
- Both human and jerboa move quickly away from danger for their safety.

Examples :



- Jerboa hops in zigzag patterns, so it can escape quickly from danger.



- Human moves quickly his hand aw when it touches the spines of a ca plant.

alert ينبه | reaction time زمن الإستجابة | spines أشواك | cactus



▶ Based on your understanding of the activity :

- Clarify the super senses that were most helpful for a jerboa in sensing danger.

....

▶ Put (✓) or (✗) :

1. When a jerboa feels unsafe, its brain sends messages to its legs through its nervous system to run away from danger. ( )
2. The reaction time is the time taken by a jerboa to respond to danger. ( )
3. Jerboa's hind legs are short to help it jump long distances. ( )

Optional Digital Activity

Activity **9** **"Nerves"** in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

In the Assessment Book :
Try to answer :
Self-Assessment (9)

Exercises on Lesson 3

● Understand ● Apply ● Analyze ● Evaluate ● Cre...

1 Choose the correct answer :

- 1. When a jerboa hears the sound of a moving snake, it ....
  - a. remains standing in its place.
  - b. jumps to hunt the snake.
  - c. makes sounds to frighten the snake.
  - d. jumps quickly to run away from the snake.
- 2. The responsible system for moving your hand away from danger, such as touching a hot cup of tea, is the .... system.
  - a. digestive b. respiratory c. nervous d. urinary
- 3. When snakes make a noise, the sensory receptors found in jerboa's .... a warning message to the brain.
  - a. ears b. nose c. feet d. teeth
- 4. When your hand touches the spines of a cactus plant, it is withdrawn in ....
  - a. less than one second. b. one minute.
  - c. two minutes. d. one hour.

2 Put (✓) or (✗) :

- 1. The body senses and systems work separately when animals run away from their enemies.
- 2. The Egyptian jerboa lives in forests.
- 3. The Egyptian jerboa has large ears which help in sensing the snakes.
- 4. The Egyptian jerboa can jump for long distances depending on its long hind legs. (Kafr El-Sheikh 2022)
- 5. Hopping of the jerboa in zigzag patterns to run away from danger is considered as a structural adaptation.
- 6. The large ears of jerboa is an example of structural adaptation.
- 7. The habitat of the jerboa is similar to that of the polar bear.

3 Write the scientific term of each of the following :

- 1. A desert rodent with a small body, large ears and long hind legs. (..........
- 2. The time taken by an organism's body to respond to different reactions. (..........
- 3. A system that works inside the body to keep the organism away from danger. (..........
- 4. The organ which receives and processes the messages sent from the sensory receptors that are found in a jerboa's ears. (..........

4 Complete the following sentences :

1. Hopping of the Egyptian jerboa in zigzag patterns is considered as a .... adaptation.
2. The presence of hair on a jerboa's feet and toes is a .... adaptation.
3. The Egyptian jerboa and the fennec fox have an excellent sense of ...., where both of them have large ....
4. The Egyptian jerboa has long .... to help it jump for long distances, and it has hair on its feet and toes to help it ....
5. When hearing an alarm ring, the sensory receptors that are found in the .... send a message through a network of nerves to the .... which determines what to do to avoid danger.
6. When the Egyptian jerboa is in danger, it starts to run away, this action occurs in a very short time called the ....

5 Correct the underlined words :

1. When your hand touches the spines of cactus plant, you move it away <u>slowly</u>. (.....................)
2. A jerboa's feet and toes are covered with <u>feathers</u>. (.....................)
3. The <u>digestive</u> system delivers messages through a network of nerves around all body parts. (.....................)
4. The long hind legs of jerboa are considered as <u>behavioral</u> adaptation. *(Damitta 2022)* (.....................)

6 Give reasons for :

1. The Egyptian jerboa can jump for long distances.

....

2. The presence of hair on the Egyptian jerboa's feet and toes.

....

3. The Egyptian jerboa's ears play a very important role in its survival.

....

....

7 What happens if ... ?

1. Your hand touches the spines of a barbary fig plant.

....

2. The Egyptian jerboa hears a snake moves towards it.

....

● Understand ● Apply ● Analyze ● Evaluate ● Create

8 **If you knew that the color of the desert jerboa is the same color as sand,**

a. Is the color of the jerboa a structural or behavioral adaptation?

....

b. In your opinion, how does this adaptation help the jerboa survive? *(Alexandria*

....

....

9 **Arrange the following sentences according to how the body parts of Egypt jerboa act to avoid danger:**

(..............) The brain alerts the jerboa's legs to start moving.

(..............) The brain processes the message telling there is a danger.

(..............) A jerboa hears a snake moving towards it.

(..............) The jerboa jumps in zigzag paths to run away from the danger.

(..............) The sensory receptors that found in jerboa's ears send a message to the brain.

LESSON 4

Activity 10 Reaction Time

▶ **Look at the following picture, then put (✓) or (×) :**



Both eyes and ears receive information from the environment, then send them to the brain to process these information. ( )

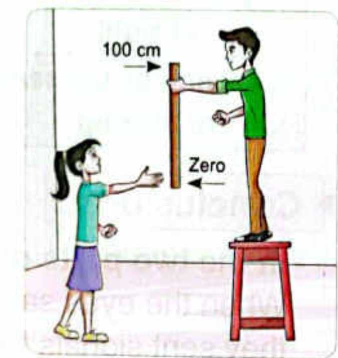
▶ **In this experiment, we will find the reaction time for catching a meterstick that is dropped.**

Tools

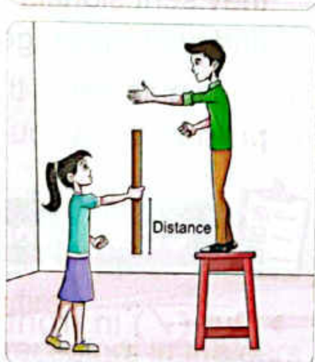
Meterstick (100 cm) – Chair.

Steps

In the first part of this experiment, we will use the sense of sight to see when the meterstick is dropped.



1. A boy stands on the chair holding the top of the meterstick (at 100 cm), while a girl approaches her hand near the end of the stick (at zero) without touching it.
2. The boy drops the stick and the girl will try to catch it as fast as she can.



3. Record the distance that the stick fell before the girl catches it.
4. Repeat the previous steps three times, then record the results in the Reaction Time Data Table, circle the middle number of distance and record this number in the Median Distance column.

Note
It is important to do multiple trials to improve accuracy.

In the second part of this experiment, we will use the sense of hearing to listen for a signal to know the meterstick is dropped.

5. Repeat the step ①, while covering the eyes of the girl.
6. Ask the boy to say the word "go" when he releases the stick.
7. Repeat the steps ②, ③ and ④.
8. Use the following Meters/Second Conversion Chart to convert the median distance to reaction time, then record the time in the final column of the Reaction Time Data Table.



Meters/Second Conversion Chart

Distance (cm)	5	10	15	20	25.5	28	43	61	79	99
Time (sec.)	10	14	17	20	23	25	30	35	40	45

Observation

Reaction Time Data Table

Experiment	Trial ①	Trial ②	Trial ③	Median Distance	Reaction T
1. Relying on the sense of sight :	28 cm	15 cm	10 cm	15 cm	17 sec
2. Relying on the sense of hearing :	79 cm	61 cm	43 cm	61 cm	35 sec

Conclusions :

- **In the two parts of the previous experiment :**
When the eyes saw the meterstick drop, or when the ears heard the voice "g they sent signals to the brain through nerves. The brain processed the inforn and sent messages to the muscles in the hand to catch the stick.
- You could catch the meterstick faster when you saw it drop, because the bra process what you see faster than what you hear.

Check your understanding

▸ **Put (✓) in front of the situations that illustrate the importance of reaction time :**

1. Seeing the red traffic light and pressing the brakes on a car. (
2. Hearing a fire alarm and running away from this place. (
3. Falling while playing football. (
4. Holding a hot object and dropping it. (

In the Assessment Boo
Try to answer :
Self-Assessment ⑩

 brakes الفرامل conversion تحويل chart

1 Choose the correct answer :

1. Reaction time can be estimated from the time between ....
   a. suitable response, and sending message to the brain by the sensory receptors.
   b. sending message to the brain by the sensory receptors, and suitable response.
   c. suitable response, and suitable next response.
   d. sending two messages to the brain by the sensory receptors.
2. The shorter the reaction time of a prey, the..........
   a. faster the prey can run away from the predator.
   b. faster the predator can catch the prey.
   c. longer the time taken by the prey to detect the presence of a predator.
   d. less chance the prey survives.
3. The reaction time is always ....
   a. less than one second.
   b. about four minutes.
   c. about three minutes.
   d. about two minutes.
4. Sensory receptors, brain and nerves, ...
   a. work separately from each other.
   b. work together with each other.
   c. only the brain works individually.
   d. only sensory receptors work individually.
5. When you see a car coming towards you, ... to get away from it.
   a. sensory receptors in the ears send a signal to the brain first
   b. sensory receptors in the eyes send a signal to the brain first
   c. sensory receptors in the eyes send a signal to sensory receptors in the ears
   d. sensory receptors in the ears send a signal to sensory receptors in the eyes
6. When you hear a fire alarm and smell a smoke odor, all of the following help to escape the fire, except .... *(Aswan 2022)*
   a. sensory receptors in the nose and eyes.
   b. nerves, spinal cord and brain.
   c. digestive system.
   d. different body muscles.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Reaction time	a. are responsible for moving a person to another place faraway from danger by the help of the nervous system.
2. Response	b. are responsible for getting energy from food and oxygen to run away from danger.
3. Nervous system	c. is the period from sensing danger to being away from it.
4. Body muscles	d. contains the main control center of the body.
	e. happens when the nervous system works with different body muscles.

1. .... 2. .... 3. .... 4. ....

3 Put (✓) or (X) :

1. The brain responds to information sent by the sense of hearing faster than the sense of sight. (
2. Reaction time should be as long as possible so an animal can think how to run away from a danger. (
3. Different body muscles play an important role in completing the response to danger and running away from it. (
4. If the nervous system works well, but the animal does not have enough energy to escape, it can be hunted by the predator. (

4 Correct the underlined words :

1. When you hear the fire alarm, your ears send a signal to the <u>stomach</u>. (..............
2. In response to a danger, <u>blood vessels</u> play an important role in transmitting signals to and from the brain. (..............
3. The response to a danger begins with <u>the brain</u> and ends with the suitable response. (..............

5 Complete the following sentences :

1. When you see a pencil falling, the speed at which you hold it is .... than when you just hear it falling.
2. .... is considered the linkage between the eye, brain and hand when sending information to hold a stick as it falls.

- 3. If you hurt your hand while cutting vegetables, the nerves in the .... send a signal to the ...., therefore you feel the pain.
- 4. When you taste a juice, the nerves in the .... send a signal to the brain which determines that it is sour.
- 5. The response of the eye nerves is .... than that of the ear nerves.

6 Give reasons for :

- 1. Stopping suddenly when you hear the horn of a car coming up behind you.

  ....

- 2. Runners start to run at the sound of a referee whistle.

  ....

  ....

7 Reaction time is important for all living organisms to avoid any danger or harm. What do you think might happen in the following cases if the reaction time takes a longer unsuitable time?

- 1. A snake sensing the body heat of its prey.

  ....

- 2. A jerboa hearing a snake nearby.

  ....

- 3. Seeing a glass cup falling from a shelf.

  ....

- 4. A bat sensing the sound waves returning back from a wall in front of it.

  ....

8 Arrange the following sentences which explain how the brain processes information :

(.............) The brain processes information.

(.............) The nerves of the ears send a signal to the brain.

(.............) The brain sends a signal to the muscles to move to start the race.

(.............) Hearing the whistle sound to start the race.

9

Ramy stopped suddenly, while walking down the street because he heard the horn of a car coming fast towards him from behind. Also Maha suddenly stopped, while crossing the street because she saw the same car coming fast towards her.

Which one has a faster reaction time? And why ? *(Cairo 2022)*

....

....

LESSON 5

Activity 11

How the Nervous System Works

▸ **Choose the correct answer from those between brackets :**

1. The nervous system gathers information about what is going on inside and outside the body and sends this information to the ....

(blood vessels – t

2. The nervous system is connected by .... that transmit mess around the body.

(muscles – ne

Functions of the nervous system :

1. It gathers information through the sensory organs like the eyes, ears and sk
2. It makes sense of (translates) these information through the brain.
3. It tells the body what to do according to these information.

Example:

When the ears pick up sound waves coming from a chirping bird.

↓

The nerves in the ears send a message to the brain, which translates these sound waves.

↓

Then, the brain sends a message to the body about what to do, such as turn to look for the bird on a tree.





Notes

1. Some messages, called **"reflexes"**, are so fast that you cannot realize it such as moving your hand away when touching a very hot cup of tea.
2. Other messages are sent from and to the brain automatically, like the signal to brea



Check your understanding

▸ **Complete the following sentences :**

1. The nervous system sends information through .... to the .... to be processed.
2. Collecting information about what happens inside and outside the body is on of the functions of the .... system.

transmit	ينقل	chirping	
muscles	عضلات	reflexes	الفعل المنعكسة

Activity 12 Describing the Nervous System

▸ **From the previous activity, we conclude that :**

- The parts of the nervous system work together to :
  - Sense the environment.
  - Interpret the information to decide the best action.
  - Send a signal to the body to react.
- Without all of the parts of the nervous system, the person might not receive, send or react to the information.



Check your understanding

▸ **Read the sentences that describe the nervous system, then write the correct term from the word bank in each blank :**

brain – nervous system – reflexes – nerves – spinal cord – sensory receptors.

1. The .... is like the command center for your body.
2. .... send(s) messages to the brain.
3. The brain is a part of the ....
4. .... are messages sent by the nervous system that are often so fast that you do not think about them.
5. The big nerve that passes through the backbone is called the ....
6. The .... are the nerves that lie in different places of the body and are responsible for receiving information from the environment.



Optional Digital Activity

Activity 13 "Your Nervous System" in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

In the Assessment Book :
Try to answer :
- Self-Assessment (11)
- Model Exam on Concepts (1.1) & (1.2)

interpret تفسير receive يستقبل

Exercises on Lesson 5

● Understand ● Apply ● Analyze ● Evaluate ● Cre...

1 Choose the correct answer :

- 1. Your sensation of hot weather depends on sensory receptors in the ....
  a. eyes. b. nose. c. ears. d. skin.
- 2. Recognizing thunder and lightning depends on the senses of ....
  a. hearing and sight. b. sight and smell.
  c. hearing and touch. d. hearing and taste.
- 3. Closing your eyes quickly when strong light rays fall on them suddenly represents ....
  a. inhalation. b. reflex.
  c. countershading. d. camouflage.
- 4. You opened the door of your house when you heard the doorbell. Which of following statements explains the sequence of messages inside your body this situation ? ....
  a. Ears → brain → hand. b. Ears → hand → brain.
  c. Brain → ears → hand. d. Brain → hand → ears.
- 5. You pass the football to a player in your team. Which of the following statements explains the sequence of messages inside your body in this situation ? ....
  a. Feet → nerves → brain. b. Nerves → brain → feet.
  c. Nerves → feet → brain. d. Brain → nerves → feet.
- 6. If you smell smoke from something burning nearby, then you realized you h... to move away fast. This means that there is an integration between the ...... this situation. *(Alexandria...)*
  a. digestive system and respiratory system
  b. digestive system and nervous system
  c. respiratory system and nervous system
  d. nervous system and urinary system

2 Put (✓) or (✗) :

- 1. The brain sends automatic signals so that we can breathe. (
- 2. Your fingers send signals to the brain to distinguish between smooth and rough objects. (
- 3. Parts of the nervous system work together to gather and process information then send signals. (
- 4. Sensory organs are responsible for processing information. (

3 Write the scientific term of each of the following :

- 1. It delivers messages between the spinal cord and different body organs. (..........................)
- 2. A sense by which you can recognize the sour taste of lemon. (..........................)
- 3. They are messages sent by the nervous system that are often so fast that you do not think about them. (..........................)

4 Complete the following sentences :

- 1. The .... is the organ that sends information to the brain when you smell a perfume.
- 2. If you come near your dog, its nose sends a message through the nerves to its .... alerting it that you are coming.
- 3. When you touch a very hot object, your hand moves away quickly, this action is known as .... *(Giza 2022)*
- 4. When you hear a train horn, ... in the ears send a message through a network of nerves to reach the ....
- 5. The .... is the organ that is responsible for gathering surrounding sounds, while the .... is the organ that is responsible for gathering different odors.
- 6. When an owl hears the sound of a prey, sensory receptors in the .... send information through nerves to the .... to be processed.

5 Correct the underlined words :

1. The <u>muscles</u> in the sensory organs within your body are responsible for receiving information from the surrounding environment. (..........................)
2. When your eyes are closed, you can distinguish between your brother's voice and your friend's voice, depending on your sense of <u>sight</u>. (..........................)
3. The <u>spinal cord</u> is responsible for processing sound waves coming through ears. (..........................)

6 Cross out the odd word :

1. Smell – Taste – Eyes – Hearing. (..........................)
2. Eyes – Nose – Skin – Taste. (..........................)
3. Spinal cord – Lungs – Nerves – Brain. (..........................)

7 Give reasons for :

- 1. Humans can recognize the sounds of different musical instruments.

....

- 2. The brain has an important function in the nervous system.

....

8 What happens if ...?

1. The spinal cord became absent from the components of the nervous syst

....

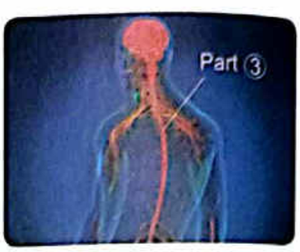
2. Sensory receptors related to the eyes stopped sending messages to the

....

9 Look at the following figures, then complete the following sentences :


Part ①

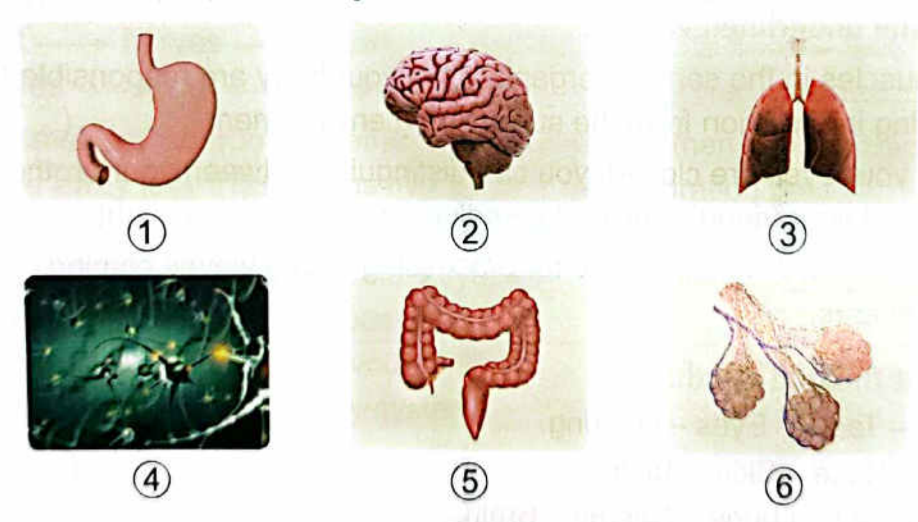

Part ②



Part ③

1. These body parts belong to the .... system.
2. When you touch a freezing bottle of water, part number .... in your hand sends a message through part number .... to reach part number .... tells you that this bottle is very cold.

10 You have some pictures of different parts of the human body. Write down organ number in front of the system to which it belongs in the following t


① ② ③ ④ ⑤ ⑥

System	Organ
1. Digestive system :	....
2. Respiratory system :	....
3. Nervous system :	....

LESSON 6

Activity 14

Record Evidence Like A Scientist

- In this concept, you have learned a lot about how the nervous system and the senses work together.
- **Now**, you are going to learn how to think like a scientist to answer a question about one of the main points of this concept through the four steps you have learned in the previous concept.
- **Complete the following steps using these words below :**

brain – information – nervous – skin – echo – adapt – sensory organs – ears – electrical impulses – nerves – nose.

Step 1 The Question

How do animals receive and respond to different information in their environment ?

Step 2 My Claim

Animals use their .... systems to receive and process information.

Step 3 My Evidence

The .... must transmit the information from the .... to the .... to be processed and perceived, since our senses cannot process information without the nervous system.

Step 4 My Scientific Explanation

- The nervous system of animals receives, transmits and processes ....
- Animals have sensory organs just as humans, including the eyes, ..., ... , tongue and ....
- When animals receive information from their environment, it is transmitted to the nerves in the form of ....
- A signal is sent to the brain, which then sends signals to other parts of the body to respond.
- Dolphins and bats get food by identifying the prey location using the ....
- The sensory organs help animals .... and survive in their habitats, since if they do not have these organs, they cannot survive.

Optional Digital Activity

Activity 15 "Careers : Become a Neuroscientist" in the school book is an optional digital activity. You can do this activity by scanning its QR code in your school book.

perceive يدرك

Activity 16 Review : Senses at Work

▶ **We can summarize this concept in the following main points :**

- Some animals have sharp senses to help them adapt to their habitats and su
- The sharpest sense in dolphins is hearing, so that a dolphin can locate its p by using echolocation (echo).
- Some animals can look for their food at night using their super senses, thes animals that become active at night are known as **"Nocturnal animals"**.

Super sensory adaptations of nocturnal animals :

- **Snakes :** Have the ability to sense heat of their preys' bodies using a specialized body part in their faces.
- **Bats :** Rely on ecolocation to find their food and move around.
- **Owls :** - Have both extraordinary sight and hearing.
  - Bowl-shaped faces and specialized head feathers pick up and an distant sounds then direct these sounds into the owls' ears.
  - Owls' large eyes allow them to detect tiny and faraway movemen their preys that hide in the grass or under the snow.
  - Owls have the ability to turn their heads in all directions to search preys everywhere.

The nervous system consists of :

- **The brain :** is the main control center in the body.
- **The spinal cord :** helps carry messages to and from the body and the brain
- **Nerves :** carry messages from the brain to the spinal cord and other parts of the body, as well as from other parts of the body to the spinal co and the brain.
  - The nerves transmit information from the sensory organs to the brain in the of **electrical impulses**.
  - The five sensory organs contain a special type of nerves known as **sensor receptors**.

The Egyptian jerboa is a desert rodent that has :

- large and sensitive ears.
- long hind legs.
- hair on its feet and toes.

Reaction time :

It is the time taken by the body of a living organism to react to different information from the environment (such as danger).

- You could catch objects faster when you saw it drop, because the brain can process what you see faster than what you hear.

Functions of the nervous system :

1. It gathers information through the sensory organs like the eyes, ears and skin.
2. It makes sense of (translates) these information through the brain.
3. It tells the body what to do according to these information.

- Some messages called **"reflexes"**, are so fast that you cannot realize it such as moving your hand away when touching a very hot cup of tea.
- Other messages are sent from and to the brain automatically, like the signal to breathe.

Model Exam on Concept (1.2)

1 (A) Choose the correct answer :

1. Senses that can distinguish between milk and water are ....
   a. taste and sight.
   b. smell and hearing.
   c. sight and hearing.
   d. taste and hearing.
2. Bats can fly without hitting walls because they can ....
   a. hear the echo reflected from them.
   b. touch them.
   c. see them clearly at night.
   d. smell them.
3. When your hand touches the spines of a cactus plant, it is withdrawn in ..
   a. one minute.
   b. two minutes.
   c. more than one hour.
   d. less than one second.
4. Brain, nerves and sensory receptors are parts of the nervous system, where
   a. only sensory receptors work individually.
   b. only the brain works individually.
   c. they work together with each other.
   d. they work separately from each other.

(B) Give a reason for :

The Egyptian jerboa has long hind legs.

....

2 (A) Correct the underlined words :

1. When you hear the fire alarm, your <u>eyes</u> send a signal to the brain. (..........
2. The <u>spinal cord</u> is responsible for processing the information coming through ears. (..........
3. The dog has sharp senses of smell and <u>taste</u>. (..........
4. The sense of sight in bats is <u>stronger</u> than that in owls. (..........

(B) What happens if ... ?

Owls cannot turn their heads in all directions.

....

....

(5 marks)

3 (A) Write the secientific term of each of the following :

1. The time taken by an organism's body to respond to different information around it. (..............................)
2. A sense by which you can recognize the sour flavor of vinegar. (..............................)
3. A system that controls all the body functions and nerves are one of its parts. (..............................)
4. The organ which receives and processes the messages sent from the sensory receptors that are found in a jerboa's ears. (..............................)

(B) Look at the opposite figure that shows the structure of the human nervous system, then answer the questions :

1. Which part spreads all around the human body ?

   ....

2. Which part is found inside the backbone of the human body ?

   ....

3. Which part represents the main control center in the human body ?

   ....

---

4 (A) Complete the following sentences : *(5 marks)*

1. The .... is the organ that sends information to the brain when you smell the scent of a perfume.
2. The response of the eye nerves is .... than that of the ear nerves.
3. Hopping of the Egyptian jerboa in zigzag patterns is considered as a .... adaptation.
4. Owls can detect the places of their preys by using the super senses of .... and ....

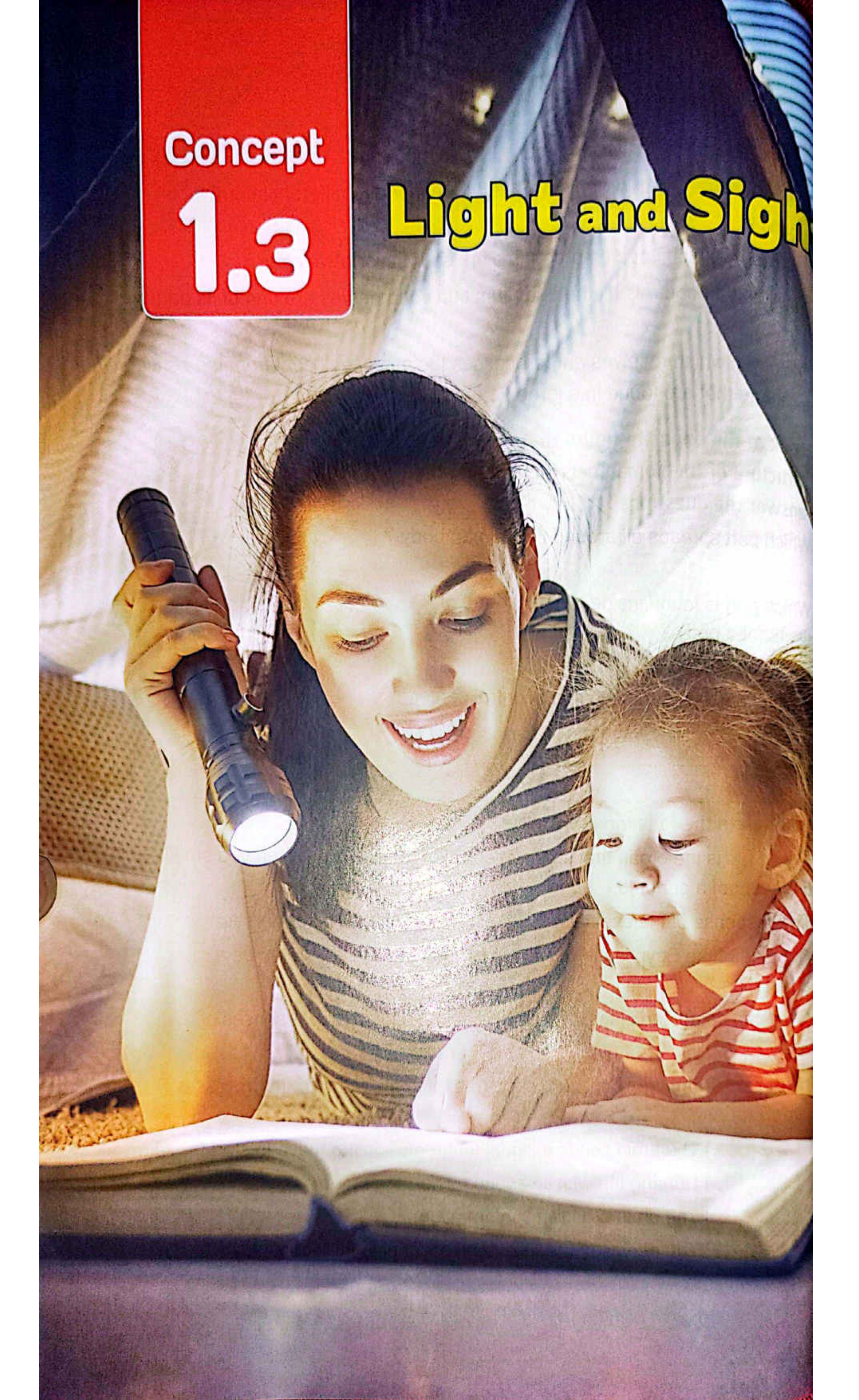
(B) Order the following statements which explain how the brain processes information :

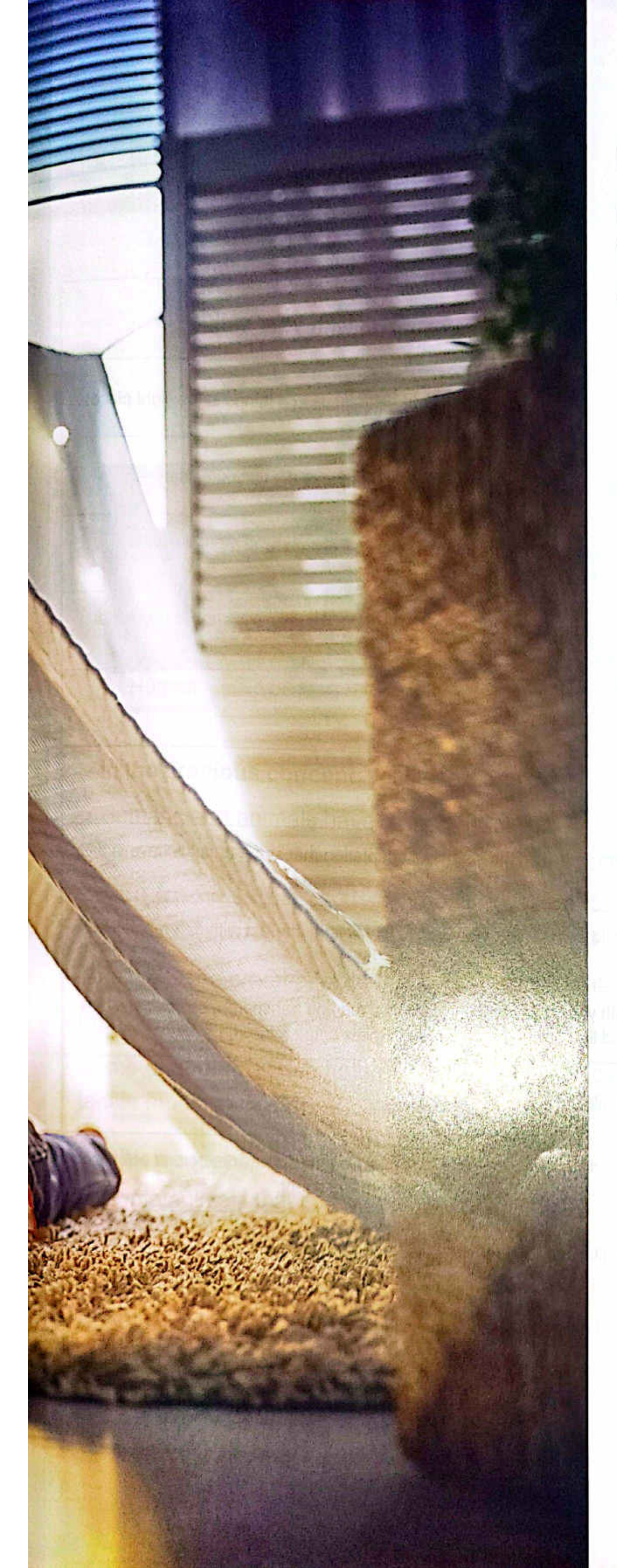
(....................) The brain sends a signal to the muscles to move to start the race.

(....................) Hearing the whistle sound to start the race.

(....................) The brain processes information.

(....................) The nerves of the ears send a signal to the brain.


Concept
1.3
Light and Sigh



Learning outcomes

By the end of this concept, your child will be able to :

- Describe how light transfers energy across distances.
- Develop a model that describes how the behavior of light enables the eye to see objects.
- Explain how adaptations help some animals gather information in the dark.

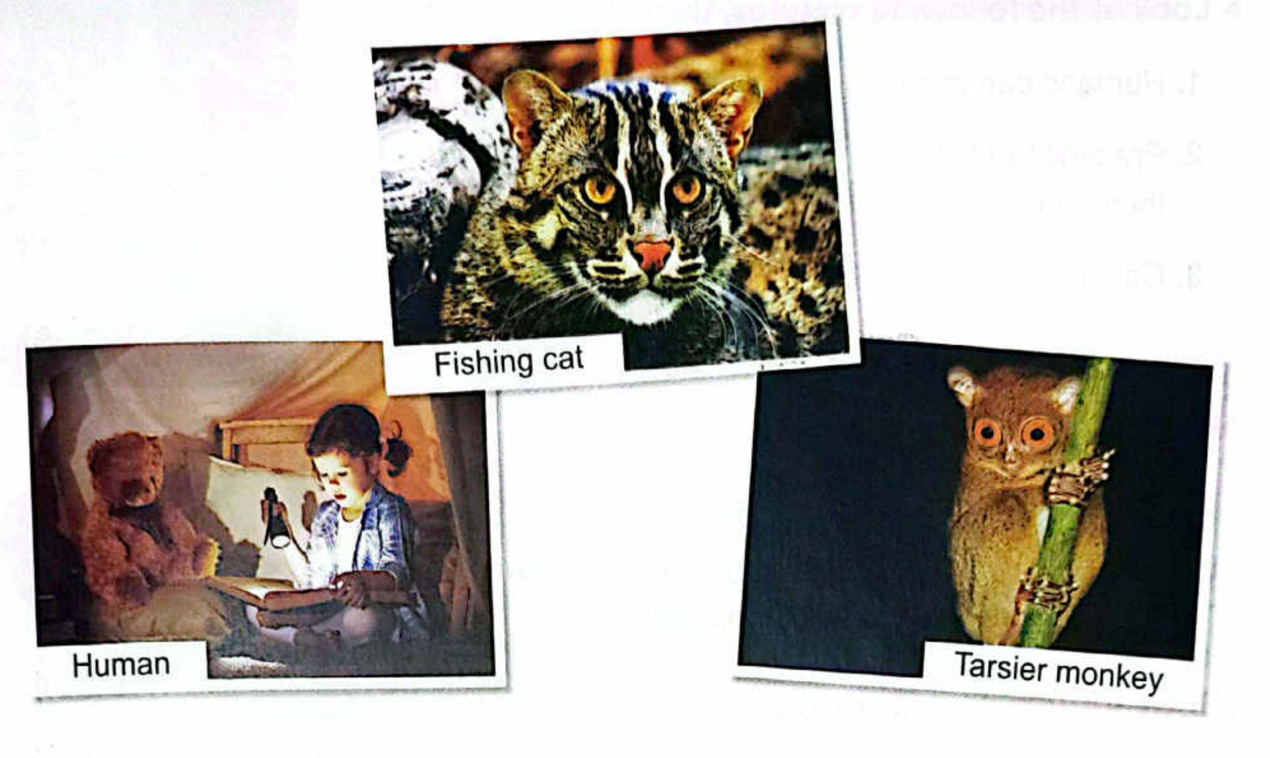
Key vocabulary

- Feature
- Light
- Matter
- Opaque
- Pupil
- Reflect
- Transparent

Lessons	Activities	What you should do with your child
1	Activity 1	Discuss with your child how humans and animals see things in low-light
	Activity 2	Discuss with your child the structural adaptation of the fishing cats eyes.
	Activity 3	Explain to your child the meaning of "sources of light" and mention some examples of them.
2	Activity 4	Discuss with your child the differences between the human eyes and the noct animal eyes such as "tarsier".
	Activity 5	Optional digital activity.
3	Activity 6	Optional digital activity.
	Activity 7	Discuss with your child the structural adaptation that some animals have eyes.
4	Activity 8	Let your child do an experiment to know how light interact with different t materials.
	Activity 9	Discuss with your child the meaning of opaque and transparent objects, an the reflected light depends on the smoothness of the reflecting surface.
5	Activity 10	Optional digital activity.
	Activity 11	Help your child to think like a scientist by writing his/her evidence and scie explanation about a certain questions on this concept.
6	Activity 12	Optional digital activity.
	Activity 13	Let your child review the main points in this concept.

LESSON 1

Activity 1 Can You Explain ?



- **In the previous concept,** you have learned that animals have senses like humans.
- Humans and animals have a nervous system that sends information from the sense organs to the brain through the nerves to process information.

Do you know what is the organ that is affected by light in humans and animals and how they can see things in low-light places ?

- **The eye** is the organ of sight that is affected by light in humans and animals.
- **Humans** need light in low-light places to see clearly.
- **Some animals** can see better than humans in the dark such as fishing cat and tarsier monkey.

In this concept, we will study :

- Some animals that can hunt in the dark.
- Light is a form of energy.
- Some special structures in the eyes of some animals.
- Reflection of light.
- How we can see different objects around us.

fishing cat القط السماك tarsier حيوان التارسير

Activity 2 Hunting with Night Vision

▶ **Look at the following pictures, then put (✓) or (✗) :**

1. Humans can see clearly in an area with low light. (   )
2. Presence of light is important for humans to see their surroundings. (   )
3. Cats can see clearly in an area with low light. (   )





Night vision in humans :

- Human eyes need light to see well.
- Without light humans would need a device known as "night vision goggles" to see in the dark.



Night vision go

Night vision in animals :

- The structure of eyes of some animals help them see in the dark such as the fishi

The fishing cat

- It is a wild cat that hunts for food at night.
- The fishing cats eyes seem to glow in the dark because :
  - It has a mirror-like membrane on the back of its eyes.
  - When the light enters the fishing cat's eyes, it bounces off this membrane, allowing the eyes to collect more light.
- The structural adaptation of cats eyes that is found in all cats allow them to have excellent night vision to hunt in the dark.





Check your understanding

▶ **Put (✓) or (✗) :**

1. The type of adaptation in the fishing cats eyes is a behavioral adaptation. (
2. All cats have mirror-like membrane in their eyes. (

clearly	بوضوح	wild	بري	membrane	
surroundings	محيط	hunt	يصطاد	excellent	
night vision goggles	نظارات الرؤية الليلية	mirror-like	مثل مرآة		

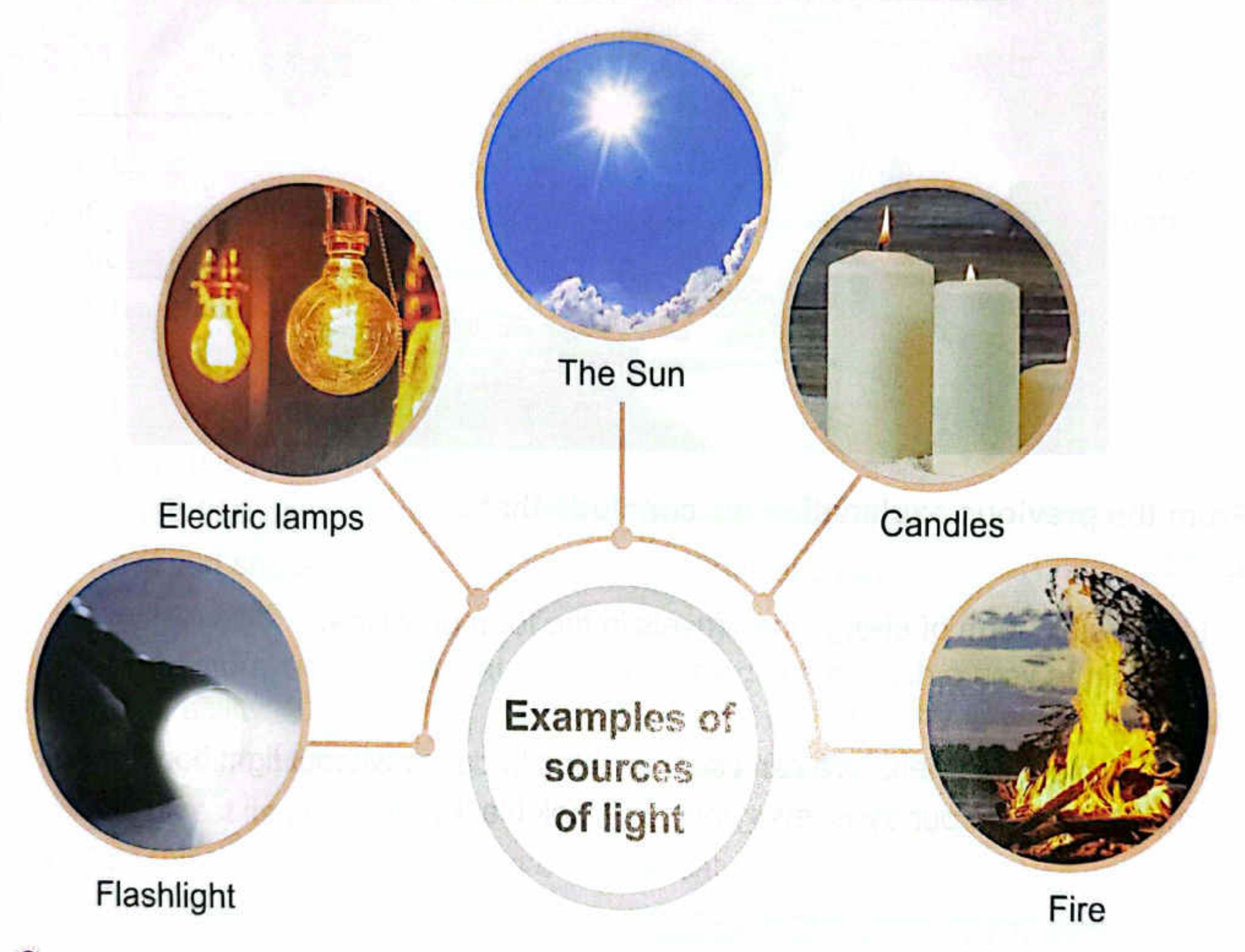
Activity 3

What Do You Already Know About Light and Sight ?

Sources of light :

A source of light :

It is something that gives off (emits) its own light.



Note

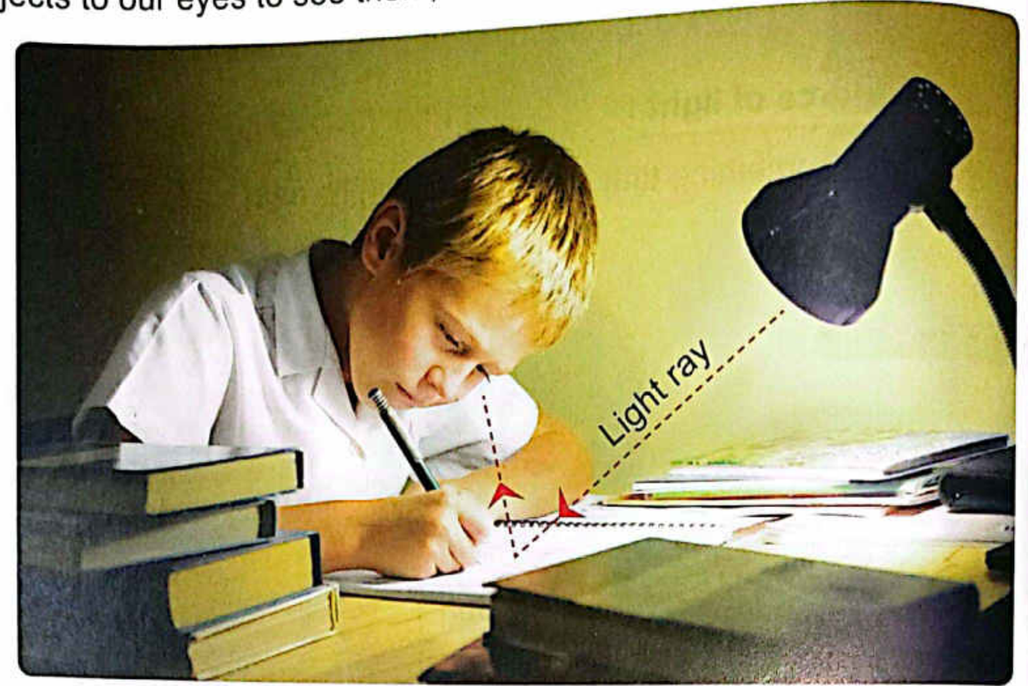
There are other objects that don't emit their own light, but they reflect the light falling on them, so they are not considered as sources of light such as :


The Moon


Mirror

How we see :

When the source of light emits light rays that fall on objects, the light rays boun these objects to our eyes to see them, as shown in the picture below.



From the previous explanation we conclude that :

Light :

It is a visible form of energy that travels in the form of waves.



Note

In complete darkness, we can't see anything because without light bouncing the objects into our eyes, everything will look black.

Check your understanding

▸ **Complete :**

There are many sources of light such as ...., ... and ....

▸ **Put (✓) or (✗) :**

1. The light falling on objects bounces back to reach the eye so that we can see these objects. (
2. The Moon is considered a source of light, so it appears bright at night. (

In the Assessment Book
Try to answer :
Self-Assessment (12)

 bounce off يرتد rays

Exercises on Lesson 1

● Understand ● Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

1. Which of the following organs are working together for seeing different objects ? .... *(Kafr El-Sheikh 2022)*
   a. Nose and brain.
   b. Eyes and brain.
   c. Ears and brain.
   d. Tongue and brain.
2. All the following things are considered as light sources, except ....
   a. the Sun.
   b. fire.
   c. eyes.
   d. the light lamp. *(Cairo 2022)*
3. If you see someone walking around in a dark place without hitting anything around him, so this person may ....
   a. have a lot of food energy.
   b. have a big ability to breathe.
   c. have the same hearing ability of bat.
   d. wear night vision goggles.
4. Animals that have strong vision to hunt at night include ....
   a. owl and snake.
   b. owl and bat.
   c. owl and cat.
   d. cat and snake.
5. The structural adaptation that helps the fishing cat to catch a prey at night, is that its ability ....
   a. to feel the heat of prey's body.
   b. to hide inside the forest.
   c. to digest its prey easily.
   d. of excellent night vision.
6. The thing that makes the eyes of fishing cats glow at night, is ....
   a. the light that bounces off the surroundings.
   b. the light that bounces off the membrane on the back of their eyes.
   c. the main controlling centre of its body.
   d. the behavioral adaptation with the surroundings.
7. The Sun and the Moon appear bright, because light ....
   a. bounces off both of them.
   b. is emitted from both of them.
   c. bounces off the Sun and is emitted from the Moon.
   d. bounces off the Moon and is emitted from the Sun.
8. The energy which must present to make our eyes able to see the objects around us is .... energy. *(Cairo 2022)*
   a. sound
   b. electric
   c. light
   d. magnetic

2 Put (✓) or (✗) :

- 1. Eyes are considered as sensory organs of light, not as a source of light.
- 2. Sight is one of the five senses at which humans and animals depend on to see the surroundings.
- 3. Cats have excellent night vision, while snakes and bats are not.
- 4. The special membrane on the back of cats eyes is similar to the Moon, in that light bounces off both of them the falling.
- 5. The membrane that presents on the back of a fishing cats eye does not p in other cat species.
- 6. The Moon is not considered as a light source.
- 7. The light that enters the human eyes allows him to distinguish between w and strong sounds.

3 Complete the following sentences using the words below :

(source of light – mirror-like – light – bounce)

1. Human eyes need .... to see well.
2. All cats have a .... membrane on the back of their eyes.
3. Object that gives off its own light is called ....
4. We can see objects when the light rays .... off these objects to our eye

4 Write the scientific term of each of the following :

- 1. The organ that is affected by light and responsible for sight. (..........
- 2. A species of wild cats, whose eyes glow at night. (..........
- 3. Objects that emit their own light. (..........
- 4. The organ that is responsible for processing information received by eyes, to know and recognize the surroundings. (..........
- 5. A body that appears lighted in the sky at night, but it is not considered as a source of light. (..........
- 6. A tool that the human can depend on to see in the dark. (..........
- 7. The visible form of energy that enables us to see. (..........

5 Correct the underlined words :

1. Humans and cats are <u>similar</u> in their seeing ability at night. (..........
2. The energy that helps humans and animals see, is the <u>sound energy</u>. *(Minia 2022)* (..........
3. The <u>Moon</u> is one of the light sources in the sky. (..........

4. The system that works with the eyes of living organisms for seeing objects is the digestive system. (..................)
5. Cats eyes glow at night due to the presence of a mirror-like membrane on the front of their eyes. (..................)
6. Sound is a visible form of energy that bounces off objects into our eyes. (..................)
7. Eyes send messages to the heart for processing information. (..................)
8. In a completely dark room, everything look red due to the absence of light. (..................)

6 Complete the following sentences :

1. The fishing cat can hunt at night depending on the sense of .... , while snake can hunt at night depending on its ability to sense .... which comes out from its prey's body.
2. The fishing cat can hunt at night due to the bouncing off .... energy, while bat can hunt at night due to the bouncing off .... waves.
3. The eyes of fishing cat have a mirror-like membrane bounces off the light, and this is considered as a .... adaptation. *(Beni-suef 2022)*
4. Human can see objects which gives off their own light or objects which .... light.
5. Among the objects which give out their own light are the Sun and .... , while .... and .... are objects that bounce off light.
6. The structure of fishing cats eyes is considered as a .... adaptation, while its being active at night to hunt is considered as a .... adaptation.

7 Give reasons for :

1. The fishing cat eyes seem to glow in the dark.

....

....

2. Candle is considered as a source of light.

....

....

3. We can see the Moon shining at night although it is not a source of light.

....

....

8 What happens if ... ?

1. The mirror-like membrane in the fishing cats eyes is damaged.

....

....

2. The Moon can't reflect light.

....

....

3. The sensory receptors of fishing cats eyes are damaged.

....

....

9 Cross out the odd word :

1. Flashlight – The Moon – Fire. (.........
2. The Moon – Mirror – Candle. (.........

10 Write the sense(s) which is/are stronger than those in human in each of th following animals :

1. Fishing cat : ....

....

2. Owl : ....

....

3. Dolphin : ....

....

LESSON 2

Activity 4 Hunting in the Dark

▸ **Put ✓ in front of the living organisms that you think they can easily see in the dark :**







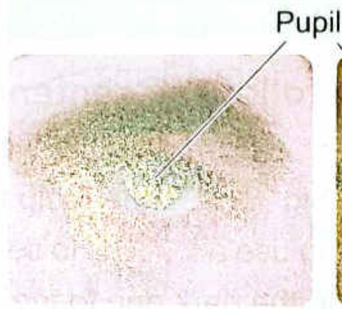
▸ **In this activity, we will learn about the difference between the eyes of humans and nocturnal animals.**

The ability of humans and nocturnal animals to see in the dark :

Humans have difficulty seeing in the dark, but nocturnal animals are better able to see because :

- Nocturnal animals have bigger eyes than humans.
- The pupils of eyes of nocturnal animals usually open wider than the pupils of human eyes to allow more light enters their eyes.

Pupil



Human eye



Cat eye

Note

Nocturnal animals can see in the weakest light levels but in complete darkness, they depend on other senses such as hearing, smell and touch that help them move in the dark and avoid predators.



Give reason for ...

The pupils of cat eyes open wider than the pupils of human eyes.

To allow more light enters the cat eyes to see well in low light.

▸ **Now, we will study another example of these nocturnal animals called "Tarsier".**

hunting الصيد pupil بؤبؤ العين / إنسان العين wider أوسع

Tarsier


Tarsier

- It is a tiny primate (tiny monkey).
- It is a mammal that feeds on insects, small lizards or birds.
- Its body is about 10 centimeters long, not including its tail.

- **Habitat :**
  Southeast Asia.
- **Structural adaptation :**
  The tarsier is like owl in some structural adaptations such as :

1. Eyes :
- **Tarsier has huge eyes like owl**, to gather and reflect any light availab to give them a picture of its surroundings.
- Tarsier can't move its big eyes in their sockets like owl.

2. Head :
- **Tarsier can turn its head 180 degrees like owl**, to focus on distant o near objects at night since tarsier cannot move its big eyes in their sock



Check your understanding

▸ **Complete the following sentences using the words below :**

(light source - eyes - mirror-like)

1. Tarseirs have big .... that help them to see everything in the dark.
2. Humans need to use a .... to see in the dark.
3. Cats can see in the dark due to the presence of .... membrane on the back of their eyes.



Optional Digital Activity

Activity 5 " Light Observation " in the school book is an optional digital activity. Yo can do this activity by scanning its QR code found in your school book.



Optional Digital Activity

Activity 6 " Light is Energy " in the school book is an optional digital activity. You c do this activity by scanning its QR code found in your school book.

In the Assessment Bo
Try to answer :
Self-Assessment (13)

primate	حيوان رئيسي	lizards	السحالي	socket	
focus	تركيز	distant	بعيد		

Exercises on Lesson 2

● Understand ● Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

• 1. Humans have .... eyes than nocturnal animals.
  a. bigger
  b. smaller
  c. stronger
  d. sharper

• 2. The pupils of human eyes open .... that of nocturnal animals.
  a. typical to
  b. narrower than
  c. wider than
  d. similar to

• 3. The wide pupils of fishing cat, allows .... amount of light enter its eyes than those of human eyes.
  a. little
  b. large
  c. very small
  d. small

• 4. Nocturnal animals depend on all the following senses to find out their preys at night, except ....
  a. sight sense.
  b. hearing sense.
  c. taste sense.
  d. smell sense.

• 5. All of the following are preys for tarsier, except ....
  a. insects.
  b. penguins.
  c. small lizards.
  d. small birds.

• 6. Both tarsier and owl, ...
  a. can swim.
  b. can fly.
  c. are nocturnal animals.
  d. belong to the same species.

• 7. Owls and .... cannot move their eyes in their sockets.
  a. fishing cats
  b. arctic foxes
  c. humans
  d. tarsiers

• 8 . Each of human, fishing cat and tarsier, ...
  a. has an excellent night vision.
  b. becomes more active at night.
  c. has a mirror-like membrane in eyes.
  d. has two eyes adapted for vision.

• 9. Which of the following do not need a big amount of light to see in the dark ? ....
  a. Humans and cats.
  b. Humans and tarsiers.
  c. Cats and tarsiers.
  d. Bats and humans.

• 10. To detect the place of a table in a completely dark room, you can depend on ....
  a. sight sense.
  b. touch sense.
  c. taste sense.
  d. hearing sense.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Tarsier 2. Human 3. Cat 4. Owl	a. has a mirror-like membrane on the back of its eyes. b. depends on the echolocation property to find a prey. c. doesn't have spectacular night vision, but depends on vision goggles. d. its eyes cannot move in their sockets, and it has a bowl-shaped face. e. its eyes cannot move in their sockets, and it is a tiny mor

1. .... 2. .... 3. .... 4. ....

3 Put (✓) or (✗) :

1. Nocturnal animals include fishing cats, owls, and tarsiers.
2. Tarsier eats insects, small lizards and small birds.
3. Tarsiers, fishing cats, humans and owls have an excellent night vision.
4. Panther chameleon eyes can move independently of each other, while tarsier and owl eyes cannot move in their sockets.
5. Both of tarsier and fishing cat can turn their heads 180 degrees.
6. Most of nocturnal animals have huge eyes to gather and reflect any little light available.

4 Write the scientific term of each of the following :

1. Animals that have spectacular night vision on which they are depend on to hunt. (..........
2. A tiny monkey with big eyes and its length is about 10 centimeters long. (..........

5 Correct the underlined words :

1. Nocturnal animals have <u>weak</u> night vision and also depend on excellent hea and smell senses to hunt. (..........
2. Nocturnal animals have <u>smaller</u> eyes than humans. (..........
3. <u>Toad</u> is a tiny monkey, that has big eyes and hunt at night. (..........
4. Tarsier is similar to <u>human</u>, where both of them cannot move their eyes in their sockets. (..........

6 Complete the following sentences :

- 1. Eyes of human are .... than eyes of nocturnal animals and pupils of nocturnal animals open .... than that in human.
- 2. In complete darkness, nocturnal animals depend on other senses such as .... , ... and ....
- 3. Tarsier and owl have huge .... , while .... has a mirror-like membrane in its eyes to reflect light.
- 4. Tarsier eyes are similar to that of .... as both of them can't move their eyes in their ....
- 5. To see things clearly, we need a source of ...., but .... animals can hunt at night depending on other senses.
- 6. In the weakest light levels, dolphin can hunt depending on its sense of ...., while tarsier depends on its sense of ....
- 7. Huge eyes in .... and .... help them to gather and reflect light, while extra-large ears in .... fox help it to hunt.
- 8. The property of moving the head 180 degrees is found in .... and .... animals, while eyes which can see in two opposite directions at the same time is found in .... animal.

7 Give reasons for :

- 1. Nocturnal animals can see better than human at night.

  ....

  ....

- 2. Although tarsier and owl can't move their eyes, they can see surrounding objects in all directions.

  ....

- 3. Tarsier and owl have huge eyes.

  ....

8 What happens if tarsier and owl have heads with small range of movement like human ?

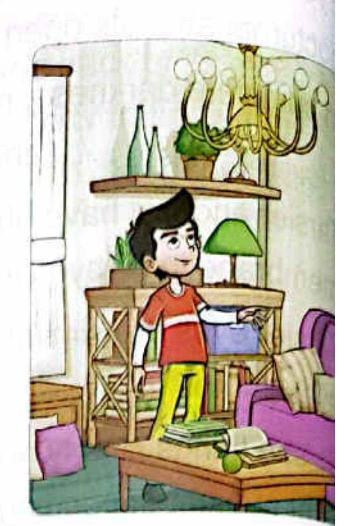
....

....

LESSON
3

Activity  **Special Eye Structures**

▶ **Look at the opposite figure, then put (✓) or (✗) :**



1. The boy can see the different objects in the room because his eyes sense the light and his brain tells him what he is seeing. (   )
2. If light is turned off, the boy will see the different objects in the room. (   )

▶ **In this activity, we will learn about a structural feature in the eye of som animals that allows them use very small amounts of light in a highly effective way.**

Special eye structures :

Some animals such as deers, horses, cats and dogs have a feature that relates to the sense of sight, called the "tapetum lucidum".



Tapetum lucidum :

- It is a thin layer, at the back of some animals eyes that reflects light as this layer in fishing cat's eye.

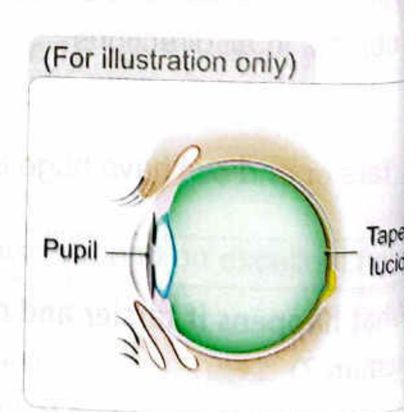
Note
Tapetum lucidum is a Latin te which means **"tapestry of lig**

- It is a life-saving structural adaptation that helps some animals to hunt at night avoid being hunted.

▶ **How tapetum lucidum works :**

- When light enters the eyes of such animals and falls on the tapetum lucidum layer, it bounces off it like a mirror.
- The light that the eyes do not detect at first passes through to the tapetum lucidum and gets bounced back for second time that makes the eyes of such animals get more amount of light at nighttime.

(For illustration only)



Cats eye

structure	تركيب	tapetum lucidum	البساط الشفاف	detect
effective	فعال	tapestry of light	نسيج الضوء	glow
deer	غزالة	layer	طبقة	shine



The reflection of light from tapetum lucidum causes the glow of the cats eyes when light shines on them in the dark.

Check your understanding

▸ Put (✓) or (✗) :

1. Tapetum lucidum is a structural adaptation in the human eyes. (   )
2. Cats can see in the dark due to the presence of a special thin layer in their eyes. (   )

In the Assessment Book :
Try to answer :
Self-Assessment (14)

Exercises on Lesson 3

● Understand ● Apply ● Analyze ● Evaluate ● Cr

1 Choose the correct answer :

- 1. Fishing cat can see at night, as follows ....
  - a. light falls on the eyes, then reflected to the objects.
  - b. light falls on the objects, then reflected into the eyes.
  - c. sound falls on the eyes, then reflected to the objects.
  - d. sound falls on the objects, then reflected into the eyes.
- 2. All the following living organisms have tapetum lucidum, except ....
  - a. snakes. b. fishing cats. c. dogs. d. horses.
- 3. The function of tapetum lucidum, looks like the function of ....
  - a. night vision goggles. b. white paper.
  - c. black paper. d. radio.
- 4. In the nocturnal animals, the tapetum lucidum is a life-saving adaptation because it helps them to .... at night.
  - a. sleep b. breathe
  - c. keep their body warm d. hunt a prey and avoid being h

2 Put (✓) or (✗) :

- 1. Human can see in dim light better than in bright light.
- 2. Light is a form of energy that is needed to see the surroundings.
- 3. Horses, deers, dogs and cats, all have a mirror-like membrane in their eyes.
- 4. If human has a tapetum lucidum, he can see in dim light as well as in bright light.

3 Write the scientific term of each of the following :

- 1. The organ of vision which receives light that has been reflected from the surrounding objects. (..........
- 2. The life-saving structural adaptation that gives fishing cat excellent night vision. (..........

4 Complete the following sentences :

- 1. Some nocturnal animals have a mirror-like membrane on the back of their e called ....

- 2. Tapetum lucidum helps some animals have an excellent night vision which is considered as .... adaptation. *(Giza 2022)*
- 3. Cats can hunt at night as they have a special membrane in their eyes known as .... , while bats can hunt at night as they use the .... property.
- 4. Tapetum lucidum .... light into the eyes of nocturnal animals like a mirror.
- 5. We can see eyes of cats glow at night due to the reflection of .... from tapetum lucidum layer.
- 6. If the eyes of bats have tapetum lucidum membrane, so they will have super senses of .... and ....
- 7. Most animals can hunt when .... bounces off a prey into their eyes, while bats can hunt when .... bounces off a prey into their ....

5 Give reasons for :

- 1. Importance of tapetum lucidum for some nocturnal animals.

  ....

- 2. The eyes of human do not glow like cats in the dark.

  ....

6 What happens if snakes have tapetum lucidum layer in their eyes ?

....

....

LESSON

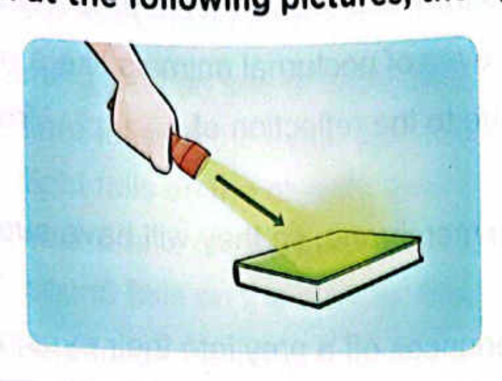


Activity 8

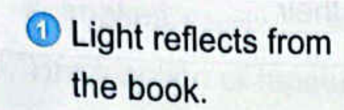


Reflection

▶ **Look at the following pictures, then put (✓) or (✗) :**





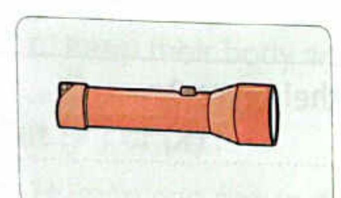


① Light reflects from the book. (   )

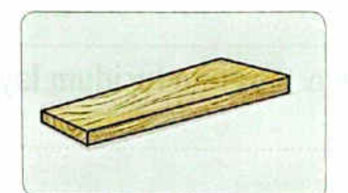
② Light reflects from the mirror.

Now, we will do an experiment that shows how light interacts with different typ materials.

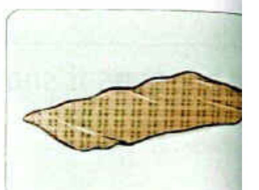
▶ Tools



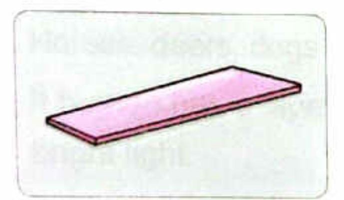
Flashlight



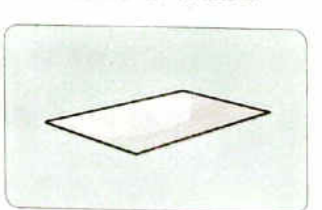
Piece of wood



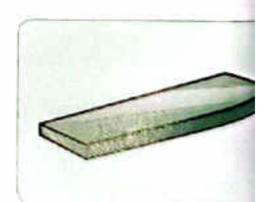
Piece of clot



Piece of plastic



Paper



Piece of meta



Mirror



▶ Step

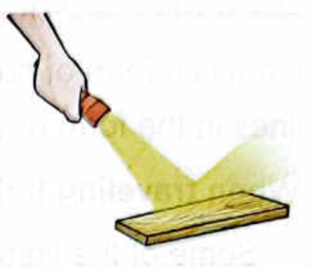
Turn on the flashlight and direct it towards each of the previous objects that a made of different materials.

interact يتفاعل direct توجيه materials

Observations



- Shiny and smooth materials (such as : mirror and metal) reflect a large amount of light.



- Rough materials (such as : plastic, wood, cloth and paper) reflect a small amount of light.

Conclusion

Shiny and smooth materials reflect light better than rough materials.

Check your understanding

Put (✓) or (×) :

1. Shiny objects tend to reflect light better than rough objects. ( )
2. Wood reflects more light than a mirror does. ( )

Choose the correct answer :

1. Which of the following objects is shiny and smooth ? ....
   a. Metallic spoon. b. Plastic spoon.
   c. Wooden chair. d. T-shirt.
2. All the following materials are rough, except ....
   a. cloth. b. mirror. c. wood. d. paper.

Activity 9 Light Strikes Matter

▸ **In this activity, we will study what happens to light when it hits different of matter.**

Light strikes matter

Light is a form of energy that travels in straight lines in the form of waves.


Light reflection

▸ **When traveling light hits an object :**

- Some of the light energy is absorbed.
- Some of the light energy reflects (bounces) off the object's surface.
- Some of the light energy may go through the object.

So, according to the previous explanation, objects can be classified into groups which are :

Opaque objects	Transparent objects
- They are objects that don't allow light to pass through. (Opaque object) - Things cann't be seen through them.	- They are objects that allow light to pass through. (Transparent o...) - Things can be seen through them.
Examples : rocks, wood, metals and the human body.	**Examples :** air, water, glass windows and lenses.

Why do you see your shadow ?

Opaque objects (including your body) form shadows because all the light that hits opaque objects either bounces off or is absorbed, so no light passes through your body.

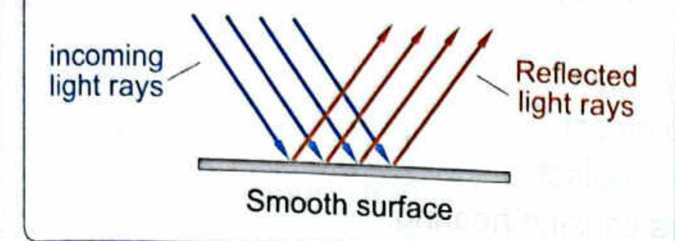


matter	مادة	form	صورة	straight	
absorb	يمتص	opaque	معتم	transparent	
shadow	ظل	hit / strike	يصدم		

▶ **The reflected light depends on the smoothness of the surface, where :**

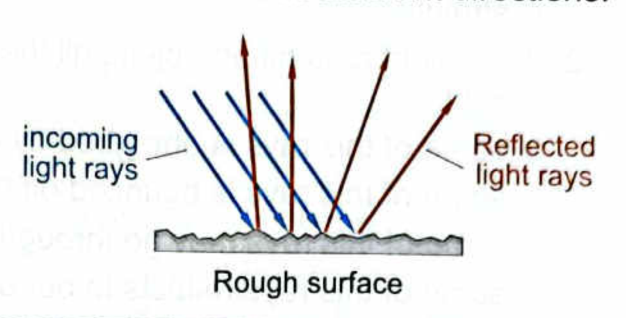
Smooth Surface

- If the surface is **smooth** (such as a mirror), the light rays will reflect in one direction with the same angle at which they strike (hit) the object originally.



Rough Surface

- If the surface is **rough** (such as a painted surface), the light rays will scatter or diffuse in different directions.



▶ **How does light striking matter make it possible for humans and animals to see ?**

When light rays strike an object, light reflects (bounces) off this object.

↓

The reflected light travels in a straight line into the eyes.

↓

Special nerves in the eyes send messages to the brain.

↓

The brain interprets the messages as an image of this object.



Check your understanding

▶ **Write the scientific term :**

1. Objects that allow light to pass through. (..................)
2. Objects that don't allow light to pass through. (..................)



Optional Digital Activity

Activity 10 " Sight Model " in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

In the Assessment Book :
Try to answer :
Self-Assessment (15)

incoming الوارد originally في الأصل scatter / diffuse تفرق / تبعثر

Exercises on Lesson 4

● Understand ● Apply ● Analyze ● Evaluate ● C

1 Choose the correct answer :

1. Light travels in .... lines in the form of waves.
   a. curved
   b. zigzag
   c. straight
   d. circular
2. When light rays hit an object, all the following sentences are correct, except ....
   a. some of this rays is absorbed by the object.
   b. some of this rays is bounced off the object.
   c. some of this rays may go through the object.
   d. some of this rays reflects to our ears causing hearing.
3. When light hits an object, a shadow of this object is formed because ....
   a. light can pass through the object.
   b. light cannot pass through the object.
   c. this object is made of glass.
   d. this object is transparent.
4. Opaque material ....
   a. allows light to pass through.
   b. absorbs some of light that falls on it only.
   c. reflects some of light that falls on it only.
   d. absorbs some of light that falls on it and reflects the other.
5. All of the following are transparent objects, except .... (Cair
   a. glass.
   b. water.
   c. paper.
   d. air.
6. Opaque objects and transparent objects are characterized by ....
   a. both of them reflect all incoming light.
   b. both of them allow all incoming light to pass through.
   c. both of them absorb all incoming light.
   d. transparent objects allow most of light to pass through, while opaque objects
7. Mirror causes falling light rays to ....
   a. pass through it.
   b. reflect at the same angle they strick the mirror.
   c. reflect in different directions.
   d. diffuse like that of rough surfaces.
8. Our eyes, ...
   a. can see both through opaque and transparent objects.
   b. cannot see through both opaque and transparent objects.
   c. can see through opaque objects, but not through transparent objects.
   d. can see through transparent objects, but not through opaque objects.

9. If there are two sheets, one is made of wood and the other is made of glass, ...
   a. you can see the glass sheet through the wood sheet.
   b. you cannot see the wood sheet through the glass sheet.
   c. you can see the wood sheet through the glass sheet.
   d. light can pass through both sheets.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Mirror	a. It is a transparent piece that allows light to pass through.
2. Piece of cloth	b. It is considered as a source of light that exists in the sky.
3. Reflected light	c. It is a rough surface that scatters reflected light rays.
4. Lenses	d. It is the light that bounces of a reflecting surface.
	e. It is a smooth and shiny surface that reflects most of falling light.

1. .... 2. .... 3. .... 4. ....

3 Put (✓) or (X) :

1. Transparent objects include mirrors and lenses. ( )
2. Rough objects tend to reflect light better than smooth objects. ( )
3. Both wooden piece and paper reflect incoming light rays at the same angle at which they struck them. ( )
4. Mirror reflects most of incoming light rays that fall on it. ( )
5. The light reflection depends on smoothness of the object's surface. ( )

4 Write the scientific term of each of the following :

1. Materials that allow light to pass through. *(Cairo 2022)* (.....................)
2. Materials that we cannot see through it. (.....................)
3. A type of surface that reflects light in different directions. (.....................)

5 Correct the underlined words :

1. We see the objects as a result of the <u>absorption</u> of light rays onto our eyes. (.....................)
2. <u>Opaque</u> materials includes water, glass, air and lenses. (.....................)
3. <u>Rough</u> objects reflect light rays in one direction at the same angle at which they struck the object. (.....................)

6 Complete the following sentences :

- 1. Light travels in .... lines. (Dakahlia)
- 2. Light and sound travel in the form of ....
- 3. Objects that light can't pass through are called ...., while objects that al light to pass through are called ....
- 4. A tree forms a shadow as it is an .... object that doesn't allow .... to through.
- 5. Cloth and paper are considered .... surfaces that scatter or diffuse ...... energy.
- 6. Human body, wood and .... are considered .... materials which ...... light to pass through.
- 7. Rough materials reflect light .... than smooth materials.
- 8. Things can be seen through .... objects such as .... and ....

7 Give reasons for :

- 1. Shadow of an opaque body is formed when light falls on it.

  ....

  ....

- 2. You can see an object placed behined a glass cup.

  ....

  ....

- 3. A mirror can reflect light better than a painted surface.

  ....

  ....

8 What happens if ... ?

- 1. You place an opaque object between a light source and a wall.

  ....

  ....

2. Light falls on a transparent body such as a glass window.

  ....

  ....

3. Light falls on a rough surface, according to the direction of the reflected ligh

  ....

  ....

9 **Arrange the following statements to show the correct sequence of how humans see different objects :**

(......................) Special nerves in the eyes send messages to the brain.

(......................) The reflected light travels in a straight line into the eyes.

(......................) The brain interprets the messages as an image.

(......................) Light rays bounce off objects around us.

---

10 **Look at the following figures, then answer the questions below :** *(Giza 2022)*

Figure (a)

Figure (b)

1. Complete :

a. The surface in figure (a) is ....

- Because ....

b. The surface in figure (b) is ....

- Because ....

c. In the previous two figures, the falling and reflected rays show that light travels in .... lines.

2. Choose :

The surface in figure (a) may be ....

a. plastic. b. wood. c. mirror. d. cloth.

---

11 **Classify the following materials into smooth materials and rough materials :**

" Piece of cloth – Mirror – Wood – Metal – Paper "

Smooth materials	Rough materials
....	....
....	....
....	....
....	....

● Understand ● Apply ● Analyze ● Evaluate ● Create

12 Classify the following materials into opaque objects and transparent obje

" Wood – Air – Water – Metal – Lenses "

Opaque objects	Transparent objects
....	....
....	....
....	....
....	....

LESSON 5

Activity 11

Record Evidence Like A Scientist

- In this concept, you have learned a lot about how vision works.
  - **Now,** try to think like a scientist by writing your evidence and your scientific explanation for the question and claim about one of the main points of this concept through the four steps you have learned in the first concept.

Step 1 The Question

What needs to happen for humans or other animals to see an object in low-light areas ?

Step 2 Claim

In low-light areas, light hits an object that reflects the light to my eyes to see this object.

Step 3 My Evidence

....

....

....

Step 4 My Scientific Explanation

....

....

....

....

....

Optional Digital Activity

Activity 12 " How Do Optometrists Help us See ? " in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

In the Assessment Book :

Try to answer :

Self-Assessment (16)

evidence	دليل	scientific explanation	التفسير العلمي
claim	فرضية	optometrist	طبيب عيون

LESSON 6

Activity 13 Review : Light and Sight

- **We can summarize this concept in the following main points :**
  - Humans need light to see clearly and without it, they will need a device kn as "night vision goggles" to see in the dark.
  - **The fishing cat** is a wild cat that hunts during the nighttime and its eyes s to glow in the dark.
  - All cats have a membrane that acts as a mirror at the back of their eyes.

A source of light :

It is something that gives off (emits) its own light.

Examples : the Sun, electric lamps, candles, flashlight and fire.

- We can see objects when the source of light emits light rays that fall on ob and bounce off these objects into the eyes, then the eyes send messages brain, where it interprets the messages as an image.

Light :

It is a visible form of energy that travels in the form of waves.

- Light travels in straight lines.
- In the absence of a light source, the human eye cannot see anything.

- Nocturnal animals are better to see in the dark than humans because they big eyes and the pupils of their eyes usually open wider than those of huma
- **The Tarsier** is a tiny "primate" monkey from mammals.
  - Tarsier has huge eyes to gather and reflect any light available.
  - Tarsier can turn its head 180 degrees like owl to focus on distant or near objects at night.

- **Tapetum lucidum** is a thin layer, at the back of some animals eyes such as deers, horses, cats and dogs.
- Tapetum lucidum is a life-saving structural adaptation that helps some anim hunt at night and avoid being hunted.
- When light falls on the tapetum lucidum, it bounces off it like a mirror.

Opaque objects :

They are objects that don't allow light to pass through.

Examples : plastic, wood and metal.

- Opaque objects (including the human body) always form shadows because all the light either bounces off or is absorbed, so no light passes through the objects.
- Things can't be seen through opaque objects.

Transparent objects :

They are objects that allow light to pass through.

Examples : air, water, windows and lenses.

- Things can be seen through transparent objects.

- **The reflected light depends upon the smoothness of the surface :**
  - If the surface is smooth (such as : a mirror), the rays will reflect in one direction at the same angle at which they strike the object originally.
  - If the surface is rough (such as a painted) the rays will scatter or diffuse in different directions.
- Shiny and smooth materials (such as : mirror and metal) reflect light better than rough materials (such as : plastic, wood, cloth and paper).

In the Assessment Book :
Try to answer :
- Self-Assessment (17)
- Model Exam on Concepts (1.1), (1.2) & (1.3)

Model Exam on Concept (1.3)

1 (A) Choose the correct answer :

1. Animals that have an excellent night vision for hunting include ....
   a. cat and snake.
   b. owl and snake.
   c. owl and bat.
   d. owl and cat.

2. Each of tarsier, human and fishing cat, ...
   a. has a mirror-like membrane in their eyes.
   b. has an excellent night vision.
   c. has two eyes adapted for vision.
   d. becomes more active at night.

3. All of the following are opaque objects, except ....
   a. cloth.
   b. water.
   c. wood.
   d. metal.

4. Painted surface .... the incoming light rays.
   a. absorbs only
   b. reflects only
   c. absorbs and reflects
   d. allows to pass

(B) Give a reason for the following :

You can see an object placed behined a glass cup.

....

....

2 (A) Put (✓) or (✗) :

1. Transparent objects don't allow light to pass through them.
2. Tarsier has huge eyes like owl to gather and reflect any light available.
3. Nocturnal animals have bigger eyes than humans.
4. Human can see in dim light as well as in bright light if his eyes contain a tapetum lucidum layer.

(B) What happens if ... ?

Light falls on a rough surface, according to how light rays is reflected.

....

3 (A) Complete the following sentences : *(5 marks)*

1. The .... is the main control center in humans and animals bodies, while .... are considered the organ of sight in their bodies.
2. Tarsier depends on the sense of .... in weak light levels, while dolphin can hunt depending on its sense of ....
3. In the eyes of .... animals, there is a tapetum lucidum that .... light like a mirror.
4. Paper and a piece of cloth are considered .... surfaces that diffuse or scatter .... energy.

(B) Cross out the odd word :

1. Fire – Candle – The Moon. (........................)
2. Fishing cat – Owl – Dolphin. (........................)

---

4 (A) Write the scientific term of each of the following : *(5 marks)*

1. They are things that give off their own light. (........................)
2. A life-saving structural adaptation that gives fishing cat excellent night vision. (........................)
3. They are objects that allow light to pass through. (........................)
4. It is a visible form of energy that travels in the form of waves. (........................)

(B) Both fishing cat and bat are nocturnal animals. Explain the sense on which each of them depends on to hunt a prey.

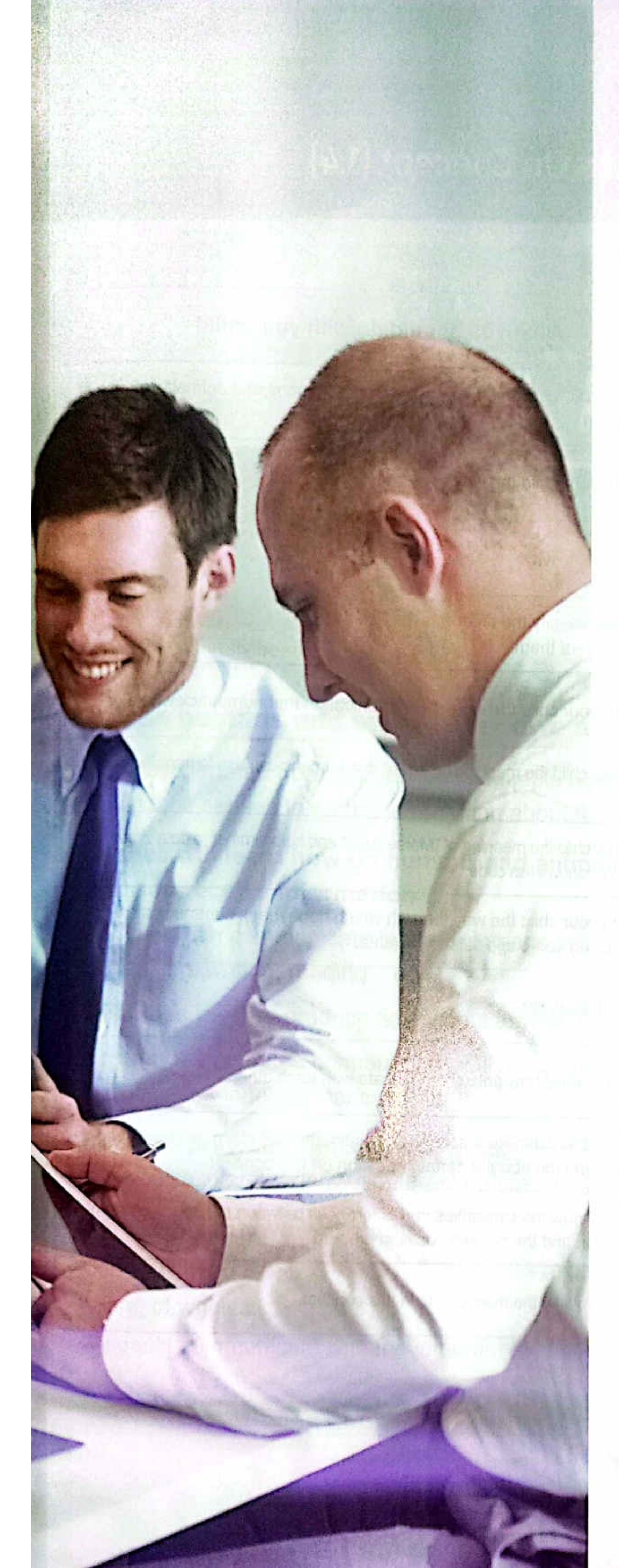
....

....

....

....


Concept
1.4
Communicatio
and Informatio
Transfer



Learning outcomes

By the end of this concept, your child will be able to :

- Compare solutions that use patterns to transfer information.
- Develop a model of a communication system with many parts that work together to transfer information from one place to another.
- Argue, using evidence, that light and sound allow for the transfer of information through systems of communication.
- Compare innovative human designs to systems of communication in the natural world.
- Design, test, and evaluate models of information-transfer systems that can send and receive coded information.

Key vocabulary

- Code
- Echolocation
- Pitch
- Satellite
- System

Notes For Parents On Concept [1.4]

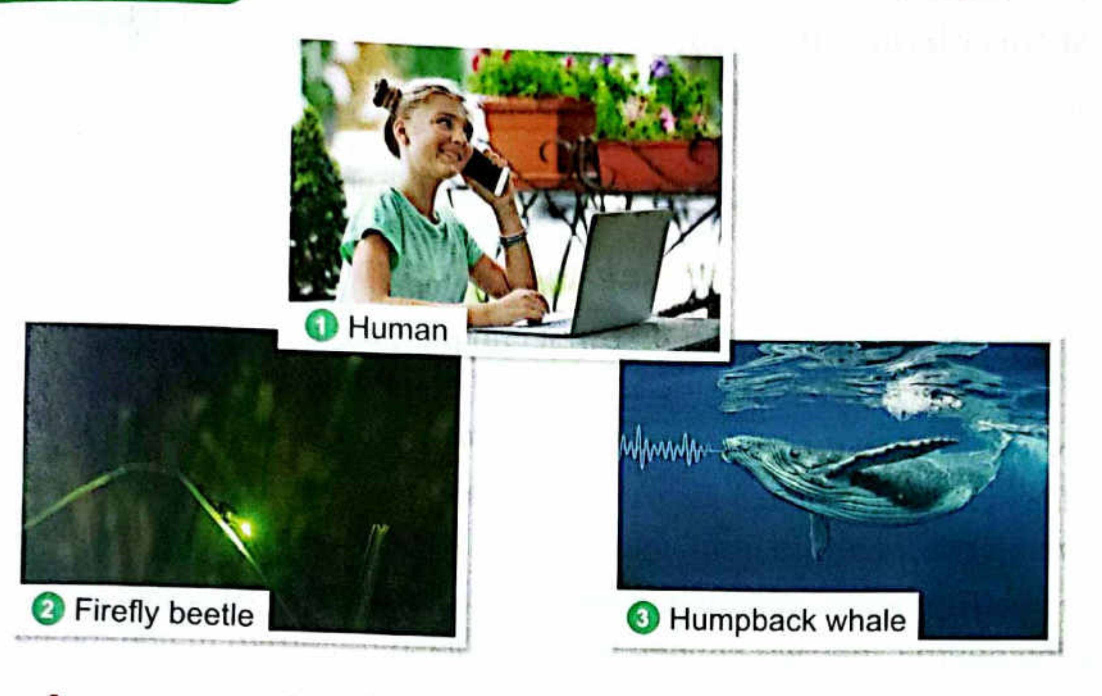
Lessons	Activities	What you should do with your child
1	Activity 1	Discuss with your child the different ways that humans and animals can u communication.
	Activity 2	Discuss with your child the way through which fireflies communicate.
	Activity 3	Optional digital activity.
	Activity 4	Let your child classify the different types of communication used by huma animals or both of them.
2	Activity 5	Discuss with your child the way of communication that humpback whale u
	Activity 6	Explain to your child the meaning of "code" that humans can use to transfer information.
3	Activity 7	Explain to your child the meaning of "Morse code" and help him/her to do a simp experiment that shows this code.
4	Activity 8	Discuss with your child the way through which honeybees communicate w each other using some special movements.
	Activity 9	Optional digital activity.
	Activity 10	Explain to your child how ants communicate with each other.
5	Activity 11	Help your child to think like a scientist by writing his/her claim, evidence ar scientific explanation about a certain question on this concept.
	Activity 12	Let your child know the similarities and differences between the special cane the blind person and the bat echolocation property.
6	Activity 13	Let your child review the main points in this concept.

LESSON

1



Activity 1 Can You Explain ?



1 Human

2 Firefly beetle

3 Humpback whale

How can humans and animals receive and send information ?

- You have learned from the previous concepts how humans and animals adapt by using their senses to gather information about the environment around them.

▸ **Now, we will learn how do humans and animals use light and sound to send and receive information ?**

1. **Human** can communicate by receiving and sending information through speaking, writing, reading ... etc.
2. **Fireflies beetles** produce flash lights to warn off predators or to attract a mate.
3. **Humpback whales** communicate with each other by using the songs they produce as tones to make music.

▸ **From the previous explanation,** we can conclude that animals and humans send and receive information with different communication systems.

▸ **In this concept, we will study :**

- Firefly light show.
- Song of whales.
- Animals communicate with movement.
- Alphabet and written language.
- Transferring information.
- Communication systems.

receive	يستقبل	information	معلومات	language	لغة
send	يرسل	fireflies beetles	الخنافس المضيئة	warn off	يُحذر من
tones	نغمات	humpback whale	الحوت الأحدب	attract	يجذب

Activity 2 Firefly Light Show



▸ **Look at this picture, then put (✓) or (✗) :**

1. Fireflies beetles are considered as a type of fish. ( )
2. Fireflies can produce light. ( )

How do fireflies beetles produce the lights they use to communic

- Fireflies beetles are type of insects that can produce a chemical reaction ins their bodies that allows them to light up and communicate with other fireflies

▸ **How do fireflies use their senses to communicate ?**

1. Fireflies use their wings to form different flash patterns to :
   - Warn off other fireflies from predators. - Attract a mate to reproduce.
2. They flash at regular periods of time, but if there is another group of fireflies flashing nearby, they will change their own flash pattern to match the flash pattern of the other group to communicate.

▸ **The interaction between humans and nature :**

- A group of artists use flashing LED lights to imitate the nature of the fireflies patterns as follow :
  - The artists turn on and off the flashing lights in the forest at regular periods of tim in a pattern.
  - A large group of fireflies responded by flashing back the same flash pattern the same time.

Note

Humans use lights to communicate with each other to transfer information such as using traffic lights.

Check your understanding

▸ **Complete:**

Fireflies produce a .... inside their bodies that allows them to .... and .... with each other.



Optional Digital Activity

Activity 3 " Alphabet and Written Language " in the school book is an optional di activity. You can do this activity by scanning its QR code found in your school book.

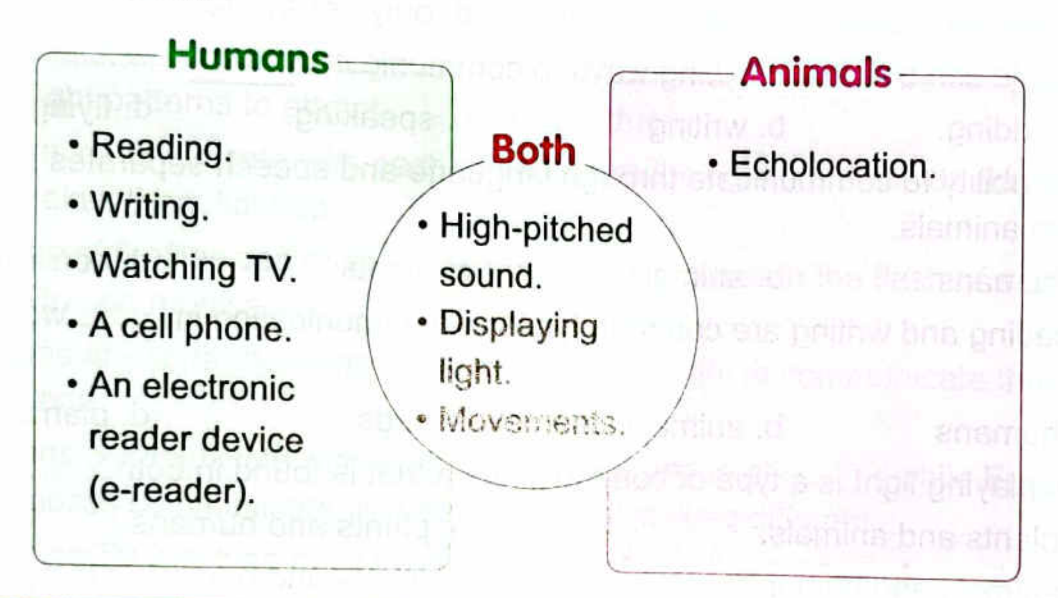
chemical reaction	تفاعل كيميائي	pattern	نمط / أسلوب	traffic lights	...ور الضوئية
regular	منتظم	artists	فنانين	interaction	
forest	غابة	imitate	يقلد		

Activity 4 What Do You Already Know About Communication and Information Transfer ?



- There are some similarities and differences between types of communication and transferring information in humans and animals.

▸ **The following figure shows some different types of communication in humans, animals and both :**



Check your understanding

▸ **Choose the correct answer :**

1. Both humans and animals can use all the following types of communication except .... which are used by humans only.
   a. sounds b. lights c. movements d. cell phones
2. .... is considered a type of communication used by animals only.
   a. Writing b. Echolocation c. Reading d. Cell phone

In the Assessment Book :
Try to answer :
Self-Assessment (18)

Exercises on Lesson 1

● Understand ● Apply ● Analyze ● Evaluate ● Cr

1 Choose the correct answer :

1. A firefly is not a bird, but it is a type of ....
   a. amphibians. b. lizards. c. beetles. d. reptiles.
2. Which of the following is not a reason for fireflies to produce a flash light ?
   a. To attract a mate. b. For communication.
   c. To warn off predators. d. To hear in the dark.
3. Changing the pattern of lighting up in a firefly is an example of .... adaptation(s).
   a. structural and behavioral b. physical and behavioral
   c. only structural d. only behavioral
4. People can use the following ways to communicate, except ....
   a. reading. b. writing. c. speaking. d. flying.
5. The ability to communicate through language and speech separates .... from animals.
   a. humans b. animals c. plants d. non living t
6. Reading and writing are common types of communication in .... world. (Giza
   a. humans b. animals c. birds d. plants
7. Displaying light is a type of communication that is found in both ....
   a. plants and animals. b. plants and humans.
   c. animals and humans. d. plants and non living things.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Watching TV 2. Echolocation 3. Displaying light	a. is a type of communication in plants only. b. is a type of communication in animals only. c. is a type of communication in humans only. d. is a type of communication in both animals and humans.

1. .... 2. .... 3. ....

3 Put (✓) or (✗) :

1. Fireflies produce flash lights to warn off predators. (
2. Humpback whales can communicate with each other by songs. (

3. Fireflies are wingless beetles. ( )
4. It is possible for a human to interact with fireflies. ( )
5. Speaking is the only way to communicate with people. ( )
6. Echolocation is a type of communication between owls. ( )

4 Correct the underlined words :

1. Fireflies produce a physical reaction inside their bodies that allows them to light up. (..................)
2. A cell phone is a device that is used in communication between animals. (..................)

5 Complete the following sentences :

1. Fireflies use the sense of .... to communicate with each other, while humpback whales communicate with each other by the sense of ....
2. Humpback whales use songs to .... with each other, while fireflies produce flash light patterns to attract .... to reproduce.
3. Fireflies communicate with each other by producing a .... inside their bodies that makes them light up.
4. A group of fireflies can change their own .... to match the flash of another group to communicate.
5. Humans are separated from animals by their ability to communicate through .... and ....
6. Dolphins communicate with each other by the sense of .... , while Egyptian mongooses communicate with each other by making different ....
7. Watching TV is a type of communication that use the senses of .... and ....
8. Echolocation is a type of communication that depends on the sense of ...., and it is used by some animals such as .... and ....
9. Among the types of communication that are used by humans only are .... and ....
10. Among the types of communication that are used by both animals and humans are .... and ....

6 Give reasons for :

1. Humans receive and send information through speaking, writing and reading.
....
2. Fireflies use different patterns of flash lights to communicate with each other.
....
3. Fireflies produce a chemical reaction inside their bodies.
....

7 What happens if ... ?

1. A person makes flashing pattern by LED lights near to a group of fireflies

....

....

2. A firefly wants to attract a mate to reproduce.

....

8 Put (✓) in front of the way of communication used in each of the following

Items	Light	Sound	Both
1. Car lamps.			
2. Television.			
3. Traffic lights.			
4. Radio.			

9 Look at the following photos, then put (✓) or (X) :

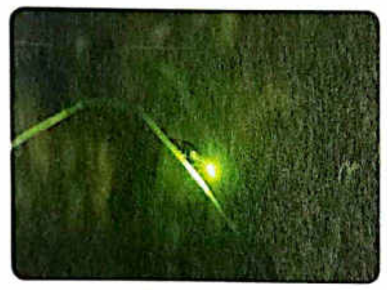


Figure (1)



Figure (2)

1. The sense that is used to communicate in photo (1) is sight only.
2. The way of communication in both photos can be used by humans.
3. The way of communication in photo (1) can be used by animals only.
4. The way of communication in photo (2) can be used by humans only.

LESSON 2

Activity 5 Song of Whales

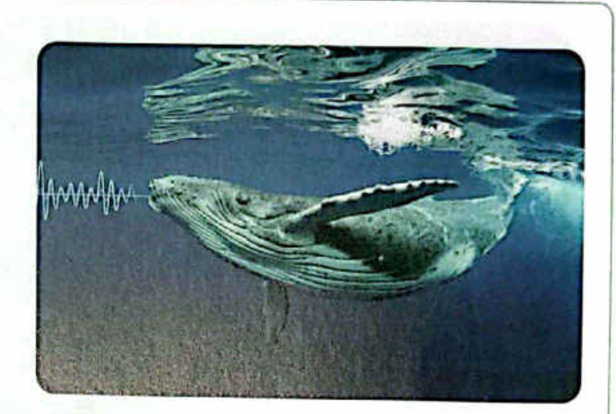
▸ **Put (✓) or (×) :**

1. Fireflies communicate with each other through sounds. ( )
2. Humans communicate with each other through language. ( )

In this activity, we are going to study how a type of whales communicate with each other under water.

Humpback whales

- Humpback whales sing under water to communicate with each other, where they sing a wide range of notes (tones) and a series of songs.
- The songs of humpback whales have different sounds depending on the season, where :



In winter	In summer
- It is the mating season. - Their songs have high-pitched sounds which travel better through cold water. (High-pitched sounds such as the sharp voice of a woman).	- It is the feeding season. - Their songs have low-pitched sounds which travel better through warm water. (Low-pitched sounds such as the rough voice of a man).

Check your understanding

▸ **Choose the correct answer :**

1. The rough sound of humpback whale is .... pitched sound.
   a. high   b. low   c. soft
2. The songs of humpback whales have a .... pitch in winter.
   a. higher   b. lower   c. rough

series	سلسلة / متوالية	feeding	التغذية
mating	التزاوج	low-pitched sound	صوت منخفض الحدة

Activity 6 Transferring Information

- Sense organs collect information about the world around us then send signals to the brain through nerves for processing and understanding.
- The senses can also be used to communicate, or share information with others.

Where,

1. Ears detect sound energy to gather information from the environment and communicate with others.
2. Eyes detect light energy that can travel very fast over different distances to gather information from the environment and communicate with others.

Examples of information that the eyes receive :



1. Seeing the red traffic light means that you must stop.



2. People use a rescue flare to get help.



3. People use signal fires to communicate over distances of many kilometers.



4. Many hikers (travelers) use mirrors to attract the attention of rescue helicopters.

Codes and transferring information :

- Humans use codes to transmit information.

Code :

It is a pattern that has meaning

rescue flare	شعلة انقاذ	attention
hikers / travelers	رحالة / مسافرين	

Examples :

- Thumbs-up or thumbs-down and traffic lights can be used to express simple meanings like good, bad, stop and go ... etc.





- Expressions on faces are codes that can help people predict our feelings such as happy, sad, angry ... etc.

- Language : is a code in the form of sounds, where different languages are different codes that are used to transfer information.





- Writing : is a code that uses symbols in a pattern to give a specific meaning according to the arrangement of letters in a word.

- Music or Sounds : different sound tones produced from humans or musical instruments can be used in communication.





- Lighthouses send codes in the form of flashes of light that tell sailors where they are.

When sense organs receive this information and send messages to the brain, the brain decodes and interprets the meaning.



Check your understanding

▸ Complete :

1. Sense organs collect information about the world around us and send signals to the .... through .... for processing and understanding.
2. The .... is a pattern that has meaning.

In the Assessment Book :
Try to answer :
Self-Assessment (19)

thumb	الأبهام	feelings	مشاعر	decode	يحل شفرة
express	يعبر	instruments	الآلات / الأدوات	interpret	يفسر
expressions	التعبيرات	lighthouse	فنار / منارة	sailors	البحارة
predict	يتنبأ / يتوقع				

Exercises on Lesson 2

Understand   Apply   Analyze   Evaluate   Cr

1 Choose the correct answer :

1. Humpback whales sing during .... months, which is the mating season.
   a. winter   b. summer   c. spring   d. autumn
2. Songs of humpback whales in winter are characterized by each of the follo... except ....
   a. having high-pitched sounds.   b. travelling better through cold water.
   c. having soft sounds.   d. having low-pitched sounds.
3. All of the following are forms of codes, except .... (Ismailia)
   a. thumb up and down hands.   b. faces expressions.
   c. writing.   d. swimming.
4. When your eyes see a red traffic light, they send a signal to you to ....
   a. increase your speed.   b. decrease your speed.
   c. keep your speed as it is.   d. stop at once.
5. People use a rescue flare to communicate with each other depending on th... sense of ....
   a. hearing.   b. sight.   c. smell.   d. touch.
6. Sense organs collect information and send signals to .... for processing understanding. (Port Said)
   a. hands   b. legs   c. brain   d. stomach
7. All the following sentences describe humpbacks' life, except ....
   a. they can communicate in cold and warm water.
   b. they mating in winter months.
   c. they have a weak hearing sense.
   d. they communicate with each other through sounds.
8. All the following signals are information that the eyes receive, except ....
   a. green traffic light.   b. fire alarm.
   c. signal fires.   d. rescue flare.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. High-pitched sound	a. is produced by humpback whales in summer.
2. Low-pitched sound	b. is produced by humpback whales in winter.
3. Thumb-up	c. is a code that means that you are in a danger.
4. Thumb-down	d. is a code that means that you say "Yes".
	e. is a code that means that you say "No".

1. ....   2. ....   3. ....   4. ....

3 Put (✓) or (X) :

- 1. Animals communicate with each other by using different senses. ( )
- 2. Humpback whales communicate with each other through flashing. ( )
- 3. Humpback whales produce more than one type of songs. ( )
- 4. Humpback whales can sing under water. ( )
- 5. Sense organs can decode the information that is sent by the brain. ( )
- 6. Expressions on faces are codes that can help people predict our feelings. ( )

4 Correct the underlined words :

1. Humpback whales have <u>similar</u> sounds according to the season. (....................)
2. Humpback whales produce low-pitched sounds in <u>winter</u>. (....................)
3. <u>Low</u>-pitched sounds travel better through cold water. (....................)
4. Different languages have <u>similar</u> codes. (....................)
5. Light travels very <u>slow</u> over distances. (....................)

5 Write the scientific term of each of the following :

- 1. A season in which the humpback whale produces high-pitched sound. (....................)
- 2. A season in which the humpback whale produces low-pitched sound. (....................)
- 3. Pitched sounds which travel through cold water better than through warm water. (....................)
- 4. Pitched sounds which travel through warm water better than through cold water. (....................)
- 5. Sense organ that can detect sound energy. (....................)
- 6. Sense organ that can detect light energy. *(Giza 2022)* (....................)
- 7. It is a pattern that has meaning. (....................)

6 Complete the following sentences :

- 1. Humpback whales communicate with each other by using the sense of .... , where they sing a wide range of .... and a series of ....
- 2. In winter months, the songs of humpback whales have .... pitched sound, because these sounds travel better through .... water.
- 3. In .... months, the songs of humpback whales have .... pitched sound, because these sounds travel better through warm water.
- 4. Humans can communicate with each other where ears of human detect .... energy and eyes of human detect .... energy.

5. Fireflies use .... energy in their communication, while humpback wh... use .... energy to communicate with each other.
6. Music is codes that use the sense of .... to communicate.
7. Writing is a way of coding that uses the sense of .... to communicat...

7 Give reasons for :

1. The songs of humpback whales have high-pitched sounds during winter months.
   ....
2. Humpback whales sing different songs.
   ....
3. The symbols that are used in writing have a specific pattern.
   ....
4. We use the expressions on faces during talking with each other.
   ....

8 What happens if ... ?

1. The hearing sense of humpback whales becomes weak.
   ....
2. The traffic light becomes red while you are going to cross the road.
   ....

9 Look at the following pictures, then complete the following sentences :


Picture (1)


Picture (2)

1. Low-pitched voice is produced from the human in picture (.............).
2. High-pitched voice is produced from the human in picture (.............).
3. The voice that is produced in picture (.............) is similar to the sound of humpback whales in summer season.
4. The voice that is produced in picture (.............) is similar to the sound of humpback whales in winter season.
5. The voice in picture (.............) travels better through cold water.
6. The voice in picture (.............) travels better through warm water.

LESSON
3

Activity 7 Inventing a Code

▸ **Complete the following sentences :**

1. Communication through the sense of sight needs .... energy.
2. Communication through the sense of hearing needs .... energy.

In this lesson, we are going to study one of human code systems known as "Morse code" which uses light or sound that allows humans to communicate with each other.

Morse code :

1. It is a communication system developed by Samuel Morse in the 19th century.
2. It is a simple code consists of short beeps known as dots and long beeps known as dashes. Different dashes and dots represent different letters of alphabet.
3. This code allows people to spell words using patterns of sounds (long and short beeps) or lights (long and short flashes).



Morse code device

MORSE CODE

A B C D E F G
H I J K L M N
O P Q R S T
U V W X Y Z

• **Now, we will invent a code that is similar to Morse code in this experiment to send and receive messages without talking.**



Tools



A small drum



Pencils



Notebooks

Steps

1. Share one of your friends to create a unique code (signal) for every letter of the alphabet using small drum.

Morse code	شفرة مورس	invent	يخترع	spell	يتهجى
dots	نقاط	dashes	شرطات	drum	طبلة

2. In a notebook, write a unique message that is no more than five words (without being seen by your friend).
3. Send your encoded message as a sender by using the drum according to the code you have created.
4. Your friend will decode your message as a receiver according to the code you have created.
5. Compare with your friend the message that he was received to the original message you have wrote in step (2).



Note

In this activity you can use a flashlight instead of the drum to create codes of the alph

Observations

- You and your friend may have incorrectly sent signals or incorrectly interpreted t
- Your code may have included the same encoding for more than one letter.

Conclusion

- We can send encoding message to communicate with each other through different ways such as :
  1. Using light energy that depends on the sense of sight.
  2. Using sound energy that depends on the sense of hearing.

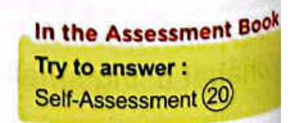
Note

To improve your code you can simplify your code.

Check your understanding

Put (✓) or (×) :

1. In Morse code, we use sound to send encoding message to communicate with each other. (
2. Morse code consists of long beeps known as dots and short beeps known as dashes. (



encode	يشفر	incorrectly	بشكل غير صحيح	simplify	
original	أصلي	flashlight	مصباح يدوي	interpreted	

Exercises on Lesson 3

● Understand ● Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

1. Different .... represent different letters of alphabet in Morse code.
   a. symbols and figures
   b. symbols and dashes
   c. figures and dots
   d. dashes and dots
2. Morse code consists of .... beeps known as dots and .... beeps known as dashes.
   a. short – short
   b. long – long
   c. short – long
   d. long – short
3. In Morse code, we can use all the following patterns, except ....
   a. long beeps.
   b. short beeps.
   c. dots.
   d. fires.
4. Both fireflies and Morse code can use .... energy in communication.
   a. sound
   b. light
   c. potential
   d. magnetic
5. If two persons communicate with each other by Morse code using light flashes, this means that the sender and the receiver will depend on the sense of .... in their communication.
   a. hearing
   b. sight
   c. taste
   d. smell

2 Put (✓) or (✗) :

1. Both humpback whales and Morse code can use sound energy in communication. *(Alexandria 2022)* (   )
2. Morse code may use long and short flashes of light instead of long and short beeps. (   )

3 Write the scientific term of each of the following :

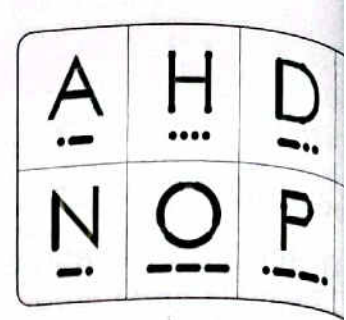
1. A communication system developed by Samuel Morse in the 19th century. (..........................)
2. The short beeps in Morse code. (..........................)
3. The long beeps in Morse code. (..........................)

4 Complete the following sentences :

1. Morse code is a .... system that depends on .... energy or .... energy.
2. Morse code is a simple code that consists of .... beeps and .... beeps.
3. The long beeps in Morse code are known as ...., while the short beeps known as ....
4. Communication by Morse code depends on our sense of .... or .... according to the used pattern.

● Understand ● Apply ● Analyze ● Evaluate ● Create

5 **The opposite table shows some encoded letters according to Morse code where short beep means a dot and long beep means a dash.**



Try to decode the following word that is represented by the following codes in the table below :

The code	The letter
① Short beep, long beep	....
② Long beep, 2 short beeps	....
③ Short beep, long beep	....
④ Short beep, 2 long beeps, short beep	....
⑤ Long beep	....
⑥ Short beep, long beep	....
⑦ Long beep	....
⑧ 2 Short beeps	....
⑨ 3 Long beeps	....
⑩ Long beep, short beep	....

⑪ The decoded word is ....

LESSON 4

Activity 8

Animals Communicate with Movement

▸ **Put the suitable word in front of each sentence : [Fireflies - Humpback whales]**

1. Living organisms that can communicate with each other by sounds. (......................)
2. Living organisms that can communicate with each other by lights. (......................)

In this activity, we are going to study how honeybees use movements to communicate with each other.

Bees and how they communicate with each other :

1. In bees hive, they do **special dances** that represent a **code** to communicate with each other.
2. The scout bee (dancing bee) moves in a **figure-eight** pattern, while vibrating its **wings**.
3. The movements of this dance tell the other bees the correct **direction** and **distance** to **food** and **water resources**.
4. The other bees read the code of the dancing bee and then fly off to the specific location.

Note

From the previous explanation we can observe that the other bees receive these codes through the sense of **sight**.

Coding with honeybees :

- The scout honeybee faces the direction of the flower where :

If the flower is very close :

The bee does one round dance.



bees	النحل	vibrating	اهتزاز	resources	مصادر
hive	خلية النحل	direction	اتجاه	specific	محدد
dance	رقص	distance	مسافة	location	موقع
scout bee	النحلة الكشافة				



If the flower is far away :

The bee does a waggle dance to the right and then to the left and this is considered as one dance where :

- **One dance = The flower is a little farther away.**
- **Three or more dances = The flower is far away.**

- **Humans use movements to communicate between each other such as**

- Sign language that is used by people of special needs.
- Simple gestures like when you shake your head to say "No".



Sign language



Check your understanding

Complete :

1. In the hive, bees can communicate to find .... and .... resources by doing a special dance.
2. People of special needs use .... to communicate with each other.

Choose the correct answer :

1. When a flower is a little farther away, the honeybee makes ....
   a. one waggle dance.
   b. one round dance.
   c. two waggle dances.
   d. two round dances.
2. .... and .... depend on the sense of sight in their communicatio
   a. Bees – bats
   b. Fireflies – humpback whales
   c. Bees – fireflies
   d. Humpback whales – bees



Optional Digital Activity

Activity 9 " Communication systems " in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

far away	بعيدا جدا	farther	أبعد	gestures	
waggle dance	رقصة اهتزازية	sign language	لغة الإشارة	shake	

Activity 10 How Animals use Communication Systems

- Technology systems allow humans to communicate with each other through :
  - Making phone calls.
  - Sending text messages and e-mails.
- Animals don't use technology systems as we do, but they can still use other systems to communicate with each other.
- We will study ants as an example of these animals.

Ants :



- Ants live in colonies that contain thousands of individuals.
- Groups of ants within a colony have different roles, where they have developed systems that help them divide their work among themselves, so there are nurse ants, scout ants and soldier ants.

How do groups of ants communicate with each other ?

When the food is low, nurse ants send smelly messages to scout ants which are responsible for locating food.

↓

The scout ants respond by sending a smelly message to alert the ants where to find the food.



Note

The soldier ants also use smelly messages to communicate if there is danger nearby.



Check your understanding

▸ **Complete :**

1. When the food is low, ... ants send .... to .... ants which are responsible for locating food.
2. The .... ants use smelly messages if there is danger nearby.

In the Assessment Book :
Try to answer :
Self-Assessment (21)

calls	مكالمات	thousands	الآلاف	nurse ants	عاملات النمل	alert	إنذار
scout ants	النمل الكشاف	individual	فرد	soldier ants	جنود النمل	nearby	قريب / محاور
colonies	مستعمرات	role	وظيفة / دور				

Exercises on Lesson 4

● Understand ● Apply ● Analyze ● Evaluate ● Cr

1 Choose the correct answer :

1. The way by which bees communicate with each other is ....
   a. echolocation. b. flash light. c. dancing. d. Morse code.
2. The bee can rotate around itself in the form of number .... as an encodi
   message for other bees.
   a. 2 b. 4 c. 6 d. 8
3. The scout honeybee makes .... round dance if the flower is very close.
   a. 1 b. 2 c. 3 d. 4
4. The scout honeybee performs a waggle dance in the direction .... if the
   flower is a little farther away.
   a. right-left b. up-down c. right-down d. left-up
5. Sending smelly messages when there is a shortage of food is the role
   of ....
   a. queen ants. b. nurse ants. c. scout ants. d. soldier ants.
6. Locating food is the role of ....
   a. queen ants. b. nurse ants. c. scout ants. d. soldier ants.
7. Alarming the colony from dangers is the role of ....
   a. queen ants. b. nurse ants. c. scout ants. d. soldier ants.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Nurse ants 2. Scout ants 3. Soldier ants	a. are responsible for reproduction and laying eggs. b. are responsible for warning from dangers. c. are responsible for locating food. d. are responsible for sending smelly messages when the amount of food decreases.

1. .... 2. .... 3. ....

3 Put (✓) or (✗) :

1. People with special needs use sign language to communicate. (
2. Movement of your head or hand is not a way of communication with your friends. (
3. Bees use flash light to communicate with each other. *(Damitta 2022)* (
4. Animals use technological systems as we do. (

4 Correct the underlined words :

1. In the hive, bees can communicate to find <u>waste</u> and water resources. (....................)
2. The dancing bee moves in a figure-<u>six</u> pattern while vibrating its wings. (....................)
3. Scout honeybees use movements codes to communicate with other bees that receive these codes through <u>hearing</u>. (....................)
4. Groups of ants within a colony have <u>similar</u> roles. (....................)
5. <u>Scout</u> ants are responsible for alarming the colony in danger. (....................)

5 Write the scientific term of each of the following :

1. Honeybees which are responsible for searching out food resources. (....................)
2. The sense by which bees receive movement codes that are sent by the scout honeybees. (....................)
3. Small living organisms that live in colonies and communicate with each other by smelly messages to perform different roles. (....................)
4. A group of ants which is responsible for sending smelly messages when there is a shortage of food. (....................)

6 Complete the following sentences :

1. Honeybees use movements in their communication to find .... and .... resources.
2. The bee dances in a figure-eight pattern while vibrating its .... , and the other bees read the .... of the dancer and than fly off to the specific location.
3. The people with special needs use movements to communicate with each other by a language called ....
4. Ants within a colony are divided into several groups such as .... ants, ... ants and .... ants, where each group do a specific role.
5. Ants use their sense of .... to communicate with each other, while bees use .... by doing special dances to communicate with each other.
6. A group of ants sends .... messages to communicate with each other.
7. Ants are similar to the .... tree in that both of them send a smelly messages for communication.
8. Both of honeybees and fireflies use the sense of .... in their communication. *(Cairo 2022)*

Understand Apply Analyze Evaluate Create

7 Give reasons for :

1. A honeybee makes figure-eight pattern movement as a way of communica with other bees.

   ....

2. The nurse ants send smelly messages to scout ants.

   ....

3. The soldier ants use smells in their communication.

   ....

8 What happens if ... ?

1. The bees in the hive didn't understand the movements of the dancer bee.

   ....

2. A person with special needs doesn't learn the sign language.

   ....

3. The smell sense of ants becomes weak.

   ....

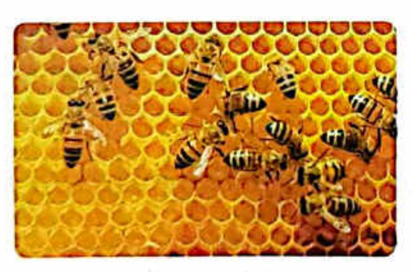
4. The amount of food in the ants colony decreases.

   ....

5. There is a danger near to an ants colony.

   ....

9 Look at the following pictures then complete the following sentences :



Picture (1)



Picture (2)

1. Insects in picture (.................) communicate with each other by the sense of smell, while insects in picture (.................) use the sense of sight to communicate with each other.
2. Insects in picture (.................) make a special dance to tell the other members in their colony where to find their food and water.
3. Insects in picture (.................) send smelly messages to the other members in their colony to tell them where to find the food.

LESSON 5

Activity 11

Record Evidence Like A Scientist

- In this concept, you have learned a lot about humans and animals communication and transfer information using sound, light and movement.

- **Now,** try to think like a scientist by writing your claim, your evidence and your scientific explanation about one of the main points of this concept through the four steps you have learnt in the previous concepts.

Step 1 The Question

How do humans and animals use light, sound and other methods like movement to send and receive information ?

Step 2 My Claim

....

....

....

Step 3 My Evidence

....

....

....

....

Step 4 My Scientific Explanation

....

....

....

....

....

evidence	دليل	scientific explanation	التفسير العلمي
claim	فرضية		

Activity 12 STEM in Action

Technology Inspired by Nature

- **Bats use sound in some purposes such as :**
  - Communicating with each other.
  - Getting information about their surroundings using their hearing sense.

How does the bat use its ears for echolocation to get informa about its surroundings in the dark ?

1. Bat makes a high-pitched sound.
2. The sound hits something nearby the bat and reflects back to it in the form of "echo".
3. Bat listens for the ec (reflected sound).
4. So, bat knows that th is something nearby



Bat Inspired technology :

- Scientists have been inspired (get benefited) by the adaptation of bat echolocatio to find ways to help **blind people** detect their surroundings, where :

Scientists have created a **special cane** that emits a high-pitched sound just like bats do.

↓

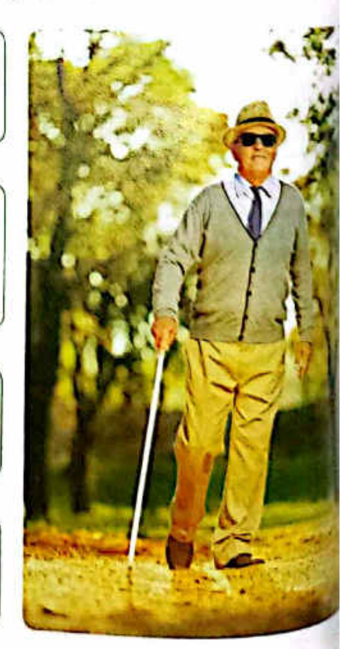
As a blind person is walking with this special cane, an echo of this high-pitched sound is picked up by this special cane.

↓

The echo is turned into vibrations that the person can feel with his thumb.

↓

The vibrations of the special cane tell the blind person the direction of the obstacles and objects around him.



inspired مستوحاه | obstacles عوائق | special cane عصا خاصة

Note

Humans cannot hear the high-pitched sounds produced either from bats or the special cane of blind people.

- **In this table we can summarize the similarities and differences between the special cane of blind person and bat echolocation.**

Special cane of blind person	Bat
Similarities	
- The special cane of blind person and bats emit a **high-pitched sound** that bounces off objects as an echo. - This special cane and bats **receive the echo** that can tell how far away objects are.	
Differences	
- This special cane picks up an echo from the sound it emits and **changes** it into a vibration that can tell the blind person where objects are around him.	- Bats pick up an echo from the sound they emit but they **don't change** it into vibrations.

How are the special cane of blind person and the honeybee dance similar ?

- Honeybees make a **series of movements and vibrations** with their wings to communicate the flower location to other bees.
- The special cane makes a **series of vibrations** to tell to the blind person using it where objects around him located.

Check your understanding

- **Put (✓) or (×) :**

1. Bats make low-pitched sound and then listen for an echo. ( )
2. Bats can change the echo into vibrations. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (22)

Exercises on Lesson 5

Understand · Apply · Analyze · Evaluate · Crea

1 Choose the correct answer :

1. Bats use their .... to get information about their surroundings in the dark. (Gharbia)
   a. nose b. tongue c. eyes d. ears
2. Echolocation in some animals is the use of .... pitched sounds for finding f
   a. medium b. low c. very low d. high
3. .... use echolocation by bouncing high-pitched sounds in the air.
   a. Bats b. Dolphins c. Whales d. Snakes
4. The echo is turned into .... that a blind man can feel in his thumb while holding his special cane.
   a. vibrations b. light c. heat d. water
5. The blind person's cane and .... emit a high-pitched sound that bounces off objects forming an echo.
   a. lizards b. polar bears c. bull sharks d. bats

2 Put (✓) or (✗) :

1. It is impossible to design technology inspired by the adaptations of some livi organisms around us. (
2. A special cane is invented to help a person who has lost the sense of hearing. (
3. The sound pitch from a blind person's cane is too high for humans to hear. (
4. Echo is turned into light that a blind man can feel while holding his special cane. (
5. Bats have the ability to change echo into vibrations just as the canes of blind persons do. (

3 Write the scientific term of each of the following :

1. A living organism that can fly and depend on the echolocation property to get information about its surroundings in the dark. (..........
2. A simple tool (device) used by blind people to walk safely. (..........

4 Complete the following sentences :

1. Bats and the special cane of blind people are similar in using .... property to locate objects.
2. Honeybee vibrates its .... to tell other bees the location of flowers while the special cane of a blind person makes a series of .... to tell him whe objects around him are located.

3. The echo that is picked up by the special cane of a blind person is turned into .... that the person can feel them with his thumb.

5 Give reasons for :

1. The echo that is picked up by the special cane of blind people is turned into vibrations.

....

2. The blind people cannot hear the sound that emits from their special canes.

....

6 What happens if ... ?

1. High-pitched sound that is produced by the blind person's cane hits an object.

....

2. Bats cannot use echolocation property.

....

3. There is a wall in front of a blind person uses his special cane.

....

7 Cross out the odd words :

1. Bats – Humpback whales – Honeybees – Dolphins. (......................)
2. Bats – Fireflies – Blind person's cane – Dolphins. (......................)

8 Look at the following pictures then complete the following sentences :

Picture (1)

Picture (2)

Picture (3)

1. Picture (..........) is similar to picture (..........) in that both of them use echolocation property.
2. Picture (..........) is similar to picture (..........) in that both of them make vibration to deliver communication messages.

● Understand ● Apply ● Analyze ● Evaluate ● Create

9 **Mention two devices that humans can use to communicate with their surroundings, where their ideas are inspired from some animal adaptations. And then mention the name of these two animals.**

Devices	Inspired from the adaptation o
1.	....
2.	....

LESSON 6

Activity 13 Review : Communication and Information Transfer

We can summarize this concept in the following main points :

- **Humans and animals** use variety of ways to communicate with each other as **sound**, **light** and **movement**.
- **Fireflies beetles** produce different flash patterns to warn off predators or to attract a mate.
- **Humans** can communicate by receiving and sending information using **language** by **speaking** , **writing and reading**.

- **Humpback whales** sing under water to communicate with each other.
  - In winter, the songs of humpback whales have high-pitched sounds that travel better through cold water.
  - In summer, the songs of humpback whales have low-pitched sounds that travel better through warm water.

Code :

It is a pattern that has meaning.

- Humans use codes to transfer information.
- **Morse code** is a simple code that consists of short beeps (dots) and long beeps (dashes).

- **Bees** use movement to communicate with each other to find food and water resources by doing **a special dance** that represents **a code**.
- **Humans** use movements to communicate as **sign language** or **simple gestures**.
- Ants communicate with each other through their sense of smell.
- Scientists created a special cane that emits a high-pitched sound just like bats do to help blind people detect their surroundings.

In the Assessment Book :
Try to answer :
Model Exam on Theme (1)

Model Exam on Concept (1.4)

1 **(A) Choose the correct answer :**

1. .... can communicate by displaying light.
   a. All animals b. All plants
   c. All plants and animals d. Humans and some animals
2. The mating season in which the humpback whales sing is ....
   a. autumn. b. summer. c. winter. d. spring.
3. When we communicate by Morse code using dots and dashes, this means we use the sense of ....
   a. touch. b. hearing. c. taste. d. smell.
4. Bees can communicate with each other by ....
   a. Morse code. b. dancing. c. flash lights. d. echolocation.

(B) Give a reason for the following :

The hearing sense is very important for bats.

....

2 **(A) Put (✓) or (✗) :**

1. The sound pitch of a blind person's cane is too high for humans to hear. (
2. Tarsier can use echolocation in communication. (
3. Humpback whales produce only one type of songs. (
4. Bees use Morse code during their communication. (

(B) What happens if ... ?

The amount of food in ants colony decreases.

....

3 **(A) Complete the following sentences :**

1. Lighthouses send codes that depend on our sense of .... while music is a code that depends on our sense of ....
2. In .... months, the songs of humpback whales have .... pitched sound, because these sounds travel better through warm water.
3. Bats use .... sound for their communication.
4. Some insects such as .... use movements by doing special dances to communicate with each other, while ants use their sense of .... to communicate with each other.

(B) The sense of sight and the sense of hearing are used in different types of communications. Choose the correct answer :

1. Which of the following communications depends on the sense of sight only ? ....
   a. Watching TV.
   b. Flashing lights of fireflies.
   c. Echolocation in dolphins.
   d. Using the cell phone.
2. Which of the following communications depends on the sense of hearing only ? ....
   a. Echolocation in bats.
   b. Rescue flares.
   c. Flashing lights of fireflies.
   d. Traffic lights.

---

4 (A) Write the scientific term of each of the following : *(5 marks)*

1. A device used by blind people to walk safely. (..........)
2. A group of ants which is responsible for sending smelly messages when there is a shortage of food. (..........)
3. It is a pattern that has meaning. (..........)
4. The short beeps in Morse code. (..........)

(B) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Bats	a. make a special dance to communicate with each other.
2. Bees	b. use echolocation during flying.
3. Blind person's cane	c. use flash lights to communicate with each other.
	d. whose vibrations when recieve echo help to find out direction.

1. .... 2. .... 3. ....

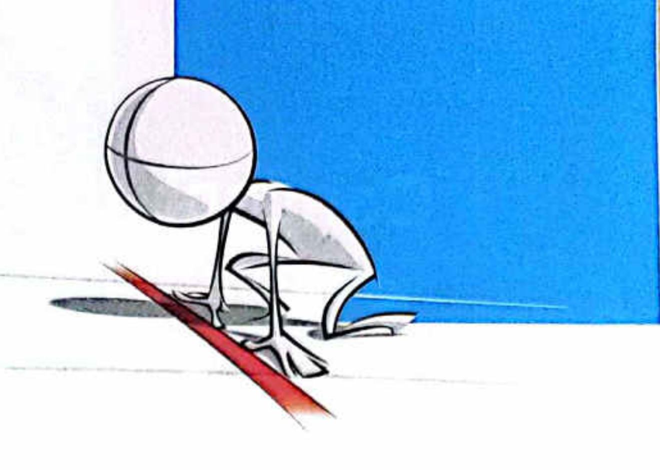
Theme Two : Matter and Energy

UNIT 2 | Motion



Get Started

What I Already Know



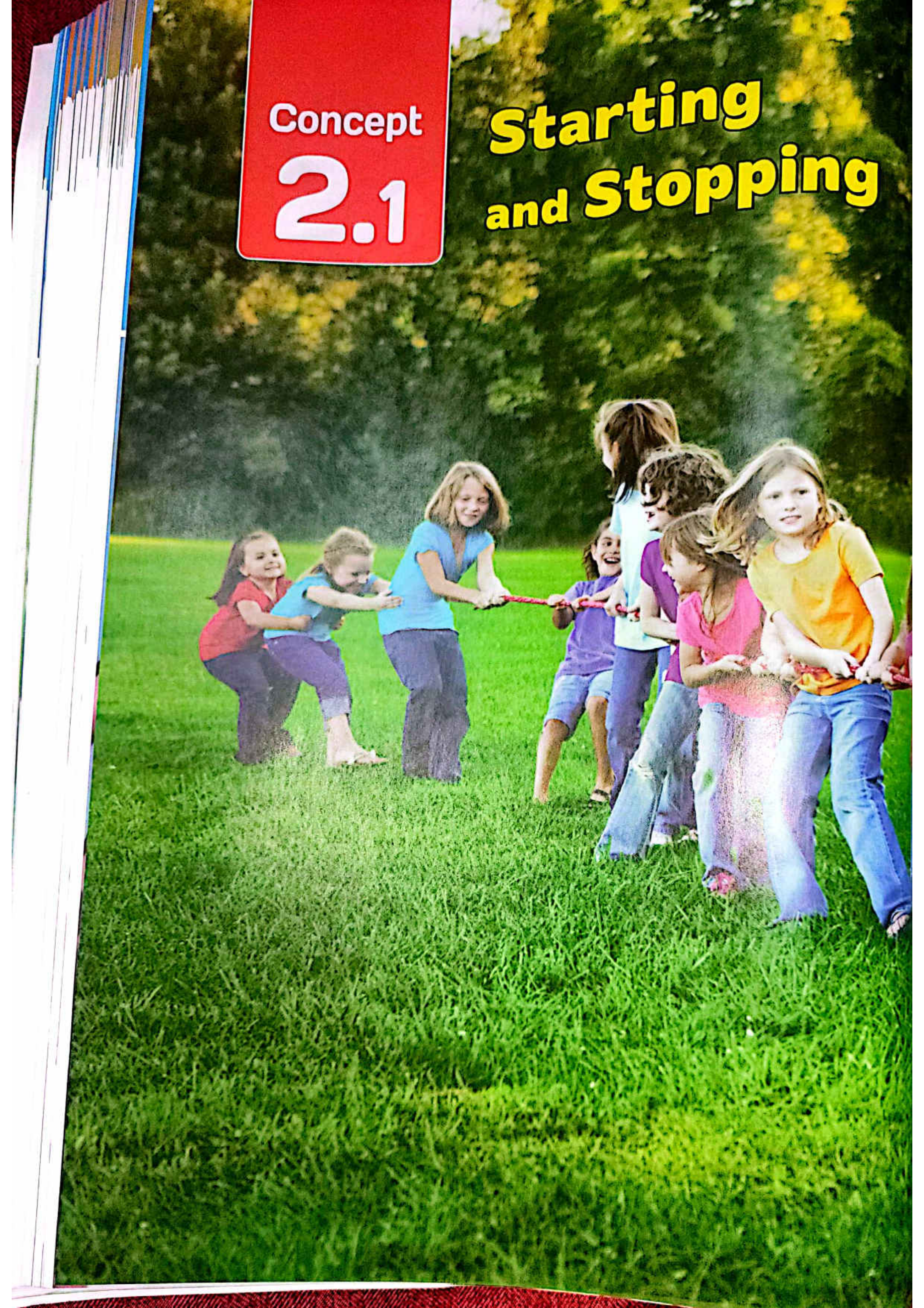
- All objects need energy to start or to stop motion.
- The opposite image shows a person in a wheelchair, where :
  - This person needs a small amount of force and energy to push the wheels of the chair to move down the ramp.
  - But, if this person needs to move up the ramp, so this person needs a larger amount of force and energy to push the wheels.

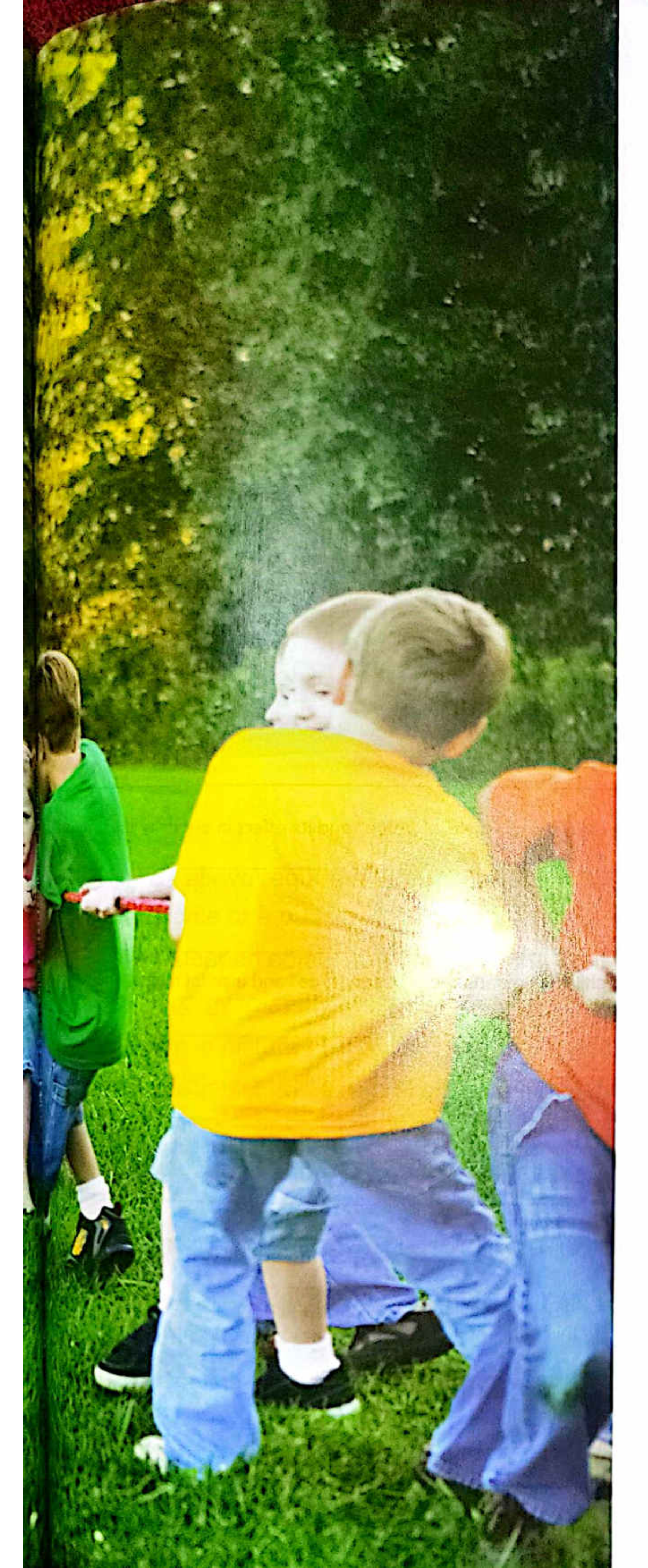


- In this unit, your are going to study :
  - How energy and motion are related.
  - How energy changes when a force affects an object.
  - The relationship between energy and work.
  - How to observe and calculate the speed of a moving object.
  - What happens when objects collide or crash together ?

- Unit project : Vehicle safety :
  - Cars have a lot of safety features to keep the driver and passengers safe during crashes such as seatbelts and airbags.
  - At the end of this unit, you are going to make a research project about one of the safety features in cars and create a plan to improve this safety features.




Concept
2.1
Starting
and Stopping



Learning outcomes

By the end of this concept, your child will be able to:

- Explain and model what causes objects to change motion.
- Analyze data to explain different causes of changes in an object's motion.
- Cite evidence to show how speed is related to energy for an object.
- Model the cause and effect relationship between the force acting on an object and the object's motion.

Key vocabulary

- Energy
- Force
- Friction
- Gravity
- Motion
- Work

Activity 2 Truck Versus Airplane

▶ **Look at the following pictures, then choose the correct answer :**




• Which of the opposite objects moves faster ?

(Truck – Airoplane)

Truck versus Jet airplane :

The engines on a jet airplane are much more powerful than the engine in a truck. **So,** jet airplanes fly much faster than moving trucks.

The shockwave truck :

The truck in the opposite figure is known as "the shockwave truck" which has been fitted with three jet engines.



The shockwave t

How does this truck move ?

The three jet engines make the shockwave truck reach speeds more than 500 kilometers per hour, which is about five times faster than the normal trucks.



How does this truck stop ?

To stop this truck, engineers turned to the idea that is used in the rocke designs, where they installed three parachutes that the driver opens to help slow down the truck quickly.





Check your understanding

▶ **Complete the following sentences using the words below :**

(faster than – slower than)

1. The speed of a normal truck is .... that of a jet airplane.
2. The speed of the shockwave truck is .... that of a normal truck.

In the Assessment B
Try to answer :
Self-Assessment 23

truck	شاحنة	fitted with	مزودة بـ
jet airplane	طائرة نفاثة	engine	محرك
engineer	مهندس	installed	
		rocket	

Exercises on Lesson 1

● Understand ○ Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

1. When you move something away from you, this represents ....
   a. pushing force. b. light energy. c. pulling force. d. sound energy.
2. When you move something toward you, this represents ....
   a. pushing force. b. light energy. c. pulling force. d. sound energy.
3. Push or pull actions are considered as types of .... *(Alexandria 2022)*
   a. force. b. device. c. energy. d. adaptation.
4. What force do you use to kick a ball with your leg ? ....
   a. Pull. b. Push. c. Sound. d. Light.
5. The speed of a normal truck is more than that of ....
   a. a jet airplane only. b. a jet airplane and a rocket.
   c. a rocket and a bicycle. d. a bicycle only.
6. Parachutes are used in the shockwave truck to ....
   a. increase its speed. b. decrease its speed.
   c. keep its speed as it is. d. change its direction.

2 Put (✓) or (✗) :

1. Putting on a pair of socks needs a pushing force. (   )
2. You need energy to push a car forward or backward. (   )
3. A car can move faster than the bicycle. (   )
4. A normal truck can move faster than the jet airplane. (   )
5. The three jet engines in the shockwave truck allow it to fly. (   )
6. A normal truck is slower than the shockwave truck. (   )
7. Parachutes are used to slow down the speed of the shockwave truck quickly. (   )

3 Write the scientific term of each of the following :

1. A force that you make to move an object towards you. (....................)
2. A force that you make to move an object away from you. (....................)
3. One of the fastest and most powerful trucks in the world. (....................)

4 Complete the following sentences :

1. The car can move or stop depending on the change of .... acting on it.

2. When you kick the ball that standing on land, it starts to ....
3. In the shockwave truck, engineers put three ....engines in it to increas speed, and they installed three .... to stop it.
4. The idea of stopping the shockwave truck is the same idea of stopping a moving ....
5. The shockwave truck starts to .... by the help of jet engines and starts .... by the help of parachutes.
6. Engineers use parachutes to slow down the motion of the .... truck an .... to stop them.

5 Give reasons for :

1. The shockwave truck is faster than the normal truck.

....

2. Engineers use parachutes in the shockwave truck designs.

....

6 What happens if ... ?

1. You kick a stopped ball on the ground.

....

2. Engineers placed jet engines inside a normal truck instead of its normal engi

....

3. The shockwave driver opens the parachutes.

....

7 Look at the following figures, then complete the following sentences :



Figure (1) : Normal truck



Figure (2) : Jet airplane

1. The engine of figure (..........) is much powerful than the engine of figure (.......
2. When the engines of figure (..........) are placed in the figure (..........) it will turn the shockwave truck.
3. The engines that are used in figure (..........) is the same engines that are used the shockwave truck.

LESSON 2

Activity 3 Making Things Move

▸ Look at the opposite pictures, then put (✓) or (×) in front of the sentences below :



1. The ball will move if the boy pushes it with his foot. ( )



2. The door will move if the person doesn't pull it with his hand. ( )

▸ **All objects around us cannot move without push and pull forces, where :**

- A ball lying on the ground untouched does not move until someone pushes it with his foot to make the ball roll.
- A closed door untouched does not move until someone pulls the handle with his hand to open the door.

Can air provide enough force to move an object ?

- Air can move the leaves of a tree by the wind blowing.

Cart activity

- Some engineers fix fire extinguishers onto a cart.
- When they release air from the fire extinguishers, the air moves backward that makes the cart begins to move forward.
- By increasing the number of fire extinguishers, the speed of the cart increases and the distance that it moves increases too and vice versa.



A cart with fire extinguishers

Check your understanding

▸ Put (✓) or (×) :

1. Push and pull forces cause objects to move. ( )
2. Air makes a force that can move some objects. ( )

roll	يدحرج	wind blowing	هبوب الرياح	cart	عربة سباق صغيرة
handle	مقبض	fix	يثبت	release	إطلاق
leaves	أوراق الشجر	fire extinguisher	طفاية حريق	distance	مسافة

Activity 4

What Do You Already Know About Starting and Stoppin

▶ **How do objects move ?**

There are two forces that cause objects to move which are :

Pushing force



A man pushes a wheelbarrow.

Pulling force



A child pulls a toy car.

The relation between motion with balanced and unbalanced fo

In the two following pictures the children are playing tug-of-war, which sh a rope being pulled in two opposite directions :



If the two teams are pulling the rope with equal forces, so the forces that act on the rope is balanced and the rope will not move.



If one team is pulling the rope wi a greater force, so the forces tha act on the rope is unbalanced an the rope will move towards the team with the greater force.

▶ **From the previous example, we can conclude that :**

- If there are balanced forces act on an object, so this object will not move.
- If there are unbalanced forces act on an object, so this object will move.

wheelbarrow عربة يدوية
balanced forces قوى متوازنة
unbalanced forces قوى غير متوازنة
tug-of-war شد الحبل
rope



Check your understanding

- Put (✓) or (✗) :

1. If an object moves, it means that the forces acting on it are balanced. (   )
2. The unbalanced forces cause objects to move. (   )

- Complete the sentence below each picture, using the words "pushing" or "pulling" :



1. The player uses the .... force to hit the ball.



2. The man uses the .... force to move his suitcase.



3. Children use the .... force in tug-of-war game.



4. The boy uses the .... force to move his skating board.

hit يضرب skating board لوح التزلج

Activity 5 Objects in Motion

How do we know an object is moving ?

- An object is in motion if it is moving from one place to another.
- When we look at an object, we can describe its position compared to other things around it.

Motion :

It is any change in the position of an object relative to a fixed point.

▸ Example of an object motion :

- Imagine that you are holding a ball and standing next to a tree when you are playing "catch".
- The starting position of the ball movement is close to the tree.



⇩

When you throw the ball from your hand, it will move by the pushing force through the air.



⇩

Then the ball will drop into your friend's hand by the pulling force of gravity.

Gravity :

It is the force that pulls objects down toward the Earth.



⇩

- The pushing force of your friend's hand against the ball will stop it.
- The position of the ball changes, relative to the tree.

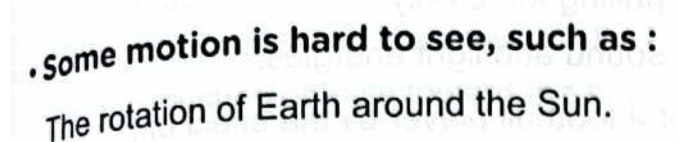


motion	حركة	imagine	يتصور	throw	
describe	يصف	holding	إمساك	drop	
relative to	نسبة إلى	catch	لعبة الصيد	gravity	



. Some motion is easy to see, such as :

- A person walking down the street.
- A leaf blowing in the wind.
- A ball traveling through the air after it is thrown.



. Some motion is hard to see, such as :

The rotation of Earth around the Sun.



▸ From the previous examples, we can observe that :

- Any object is in motion if the position of the object changes, even if this change cannot be seen.
- The change in position of an object is compared to something else that is not usually moving (fixed point).

Check your understanding

▸ Complete the following sentences using the words below :

(pull - position - force - motion)

1. A .... must act upon a ball to start motion, so the .... of the ball will change.
2. There are two types of force which are a push and a .... that cause the .... of any object.

In the Assessment Book :
Try to answer :
Self-Assessment (24)

Exercises on Lesson 2

Understand · Apply · Analyze · Evaluate · Cr

1 Choose the correct answer :

1. All objects around us can move by the effect of ....
   a. pushing force only.
   b. pulling force only.
   c. pushing and pulling forces.
   d. sound and light energies.
2. A ball may move away from the foot of a football player by the effect of ....
   a. pushing force only.
   b. pulling force only.
   c. pushing and pulling forces.
   d. sound energy only.
3. By increasing the number of fire extinguishers fixed to a cart, its speed ....
   a. increases.
   b. decreases.
   c. doesn't change.
   d. becomes zero.
4. In the tug-of-war game, two teams ....
   a. pull the rope in the same direction.
   b. pull the rope in opposite directions.
   c. push the rope in the same direction.
   d. push the rope in opposite directions.
5. In the tug-of-war game, when two teams are pulling a rope, and the rope does not move towards any team, this means that ....
   a. equal forces are being applied on the rope in the same direction.
   b. equal forces are being applied on the rope in opposite directions.
   c. unequal forces are being applied on the rope in the same direction.
   d. unequal forces are being applied on the rope in opposite directions.
6. Which of the following is an example of unbalanced forces ? ....
   a. Two persons push a box with the same force in opposite directions.
   b. Two children play on a seasaw without its moving up or down.
   c. Two children play on a seasaw, that moves up and down.
   d. Two teams play the tug-of-war game while the rope doesn't move.
7. When an object is in motion, this means that its .... changes. (Cairo
   a. color
   b. shape
   c. size
   d. position
8. All of the following are examples of motion except ....
   a. a running person.
   b. a ball travelling through the air.
   c. a flying bird.
   d. a sleeping dog.

9. You can see the movement of the following objects <u>except</u> the movement of ....
   a. a flying airplane.
   b. a running horse.
   c. sea waves.
   d. the planet Earth.

10. Gravity is a force that .... *(Kafr El-Sheikh 2022)*
    a. pushes objects down toward the Earth.
    b. pulls objects down toward the Earth.
    c. pushes objects toward the sky.
    d. pulls objects toward the sky.

---

2 Put (✓) or (X) :

1. To open or close a door, we have to push or pull it. ( )
2. When the air is released backward from the fire extinguishers fixed to a cart, the cart moves backward. ( )
3. By decreasing the number of fire extinguishers fixed to a cart, the speed of the cart increases. ( )
4. Using a remote control of a television needs a pushing force to act on its buttons. ( )
5. If the two teams in the tug-of-war game are pulling the rope with equal forces, the rope will move towards one of the two teams. ( )
6. If one team in the tug-of-war game pulls the rope with a greater force, the rope will move towards the team with the smaller force. ( )
7. The stopping object can't move until a force acts on it. *(Minia 2022)* ( )
8. The rotation of Earth around the Sun is easy to be seen. ( )

---

3 Write the scientific term of each of the following :

1. The force you can do to move an object away from you. (......................)
2. The force you can do to bring an object closer to you. (......................)
3. A change in the position of an object relative to a fixed point. (......................)
4. The force that pulls objects down toward the Earth. (......................)

---

4 Complete the following sentences :

1. The wind can move small things like .... of a tree, so engineers use this idea in moving a cart by fixing .... onto it.
2. If we put more than one fire extinguisher to a cart, so the .... of the car will increase.

Understand · Apply · Analyze · Evaluate · Create

- 3. To move anything from one place to another, you need to .... it or ....
- 4. In the tug-of-war, the .... force makes the rope move toward the stronger team.
- 5. If the pushing force on an object is equal to another pushing force in the opposite direction, the two forces are .... and the object will not move.
- 6. You can stop a basketball by the .... force of your hand against the ball.
- 7. The train's position changes relative to the train station. This sentence describes the meaning of ....
- 8. A chair stands on the floor due to the pulling force of ....
- 9. If you throw a ball through the air, it is affected by the .... force of your hand and the .... force of the Earth's gravity.
- 10. We can say that the object is in motion relative when it changes its position to a .... point.

5 Correct the underlined words :

1. By <u>increasing</u> the speed of a moving cart, the distance that it moves will decrease. (.......)
2. Moving an object away from you represents a <u>pulling</u> force. (.......)
3. Moving an object towards you represents a <u>pushing</u> force. (.......)
4. The <u>balanced</u> forces cause the object to move. *(Gharbia 2022)* (.......)
5. <u>Keeping</u> the position of an object relative to a fixed point represents motion. (.......)

6 Give reasons for :

- 1. When you kick a ball laying on the ground, it moves.

....

- 2. When two equal pushing forces act on an object in opposite directions, the object doesn't move.

....

- 3. If you let a pen out of your hand, it falls to the ground.

....

- 4. When your friend catches a ball that is thrown in the air, the motion of the ball stopped.

....

7 **What happens if the pulling forces of the two teams are equal in the tug-of-war game ?**

....

....

8 **Look at the opposite figure, then answer the following questions :**

1. In the opposite figure what happens if we increase the number of fire extinguishers fixed to the cart.

....

....

2. Put (✓) or (✗) :
   1. The air released by fire extinguishers moves backward, so the cart moves forward. (   )
   2. When we decrease the number of fire extinguishers, the cart moves for a longer distance. (   )

9 **Write the type of force that is used in each of the following situations :**

1. ....
2. ....
3. ....
4. ....

10 **Mention one example of pushing force and another example of pulling force from your daily life :**

1. Pushing force : ....
2. Pulling force : ....

LESSON 3



▶ **Look at each picture, then write if the acting force is "Push" or "Pull":**


Kicking a ball

(..........................)


Opening a drawer

(..........................)


Pressing a button

(..........................)


Lifting a bag

(..........................)

What makes objects move ?

- From the previous examples, we can conclude that any object needs a **force** to move and change its position.

Force :

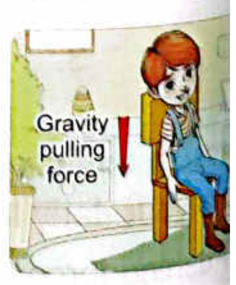
It is a push or pull that is applied to an object causes it to change its position.

▶ **What are the forces that affect the bag when you lift it ?**



- When you pull your bag up from the floor, the force of gravity pulls your bag down while your arm pulls it up.

▶ **Is there any force affects us when we are not in motion ?**



- When you sit on a chair, the force of gravity is pulling you downward and holding you in the chair.

kicking	ركل	button	زر	applied to
drawer	الدرج	lifting	يرفع	press

Check your understanding

- Look at the following pictures, then complete the sentences below each picture by writing if the forces are "balanced" or "unbalanced" (If it is unbalanced draw an arrow that shows the direction of the rope motion) :



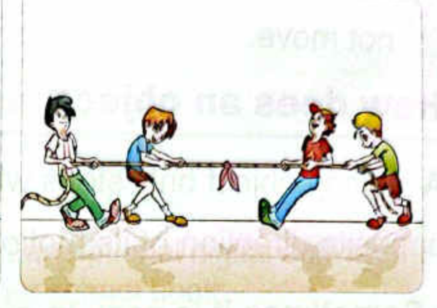
The forces in this figure are ....

Draw your arrow



The forces in this figure are ....

Draw your arrow



The forces in this figure are ....

Draw your arrow



Optional Digital Activity

Activity 7 " **Tug-of-War** " in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

Activity 8 Stopping Motion





▶ **In the opposite picture :**

- The toy car on the table is being pulled down by gravity, and also pushed up by the force that the table exerts.
- When the forces on the toy car are balanced, it does not move.

How does an object in motion stop ?

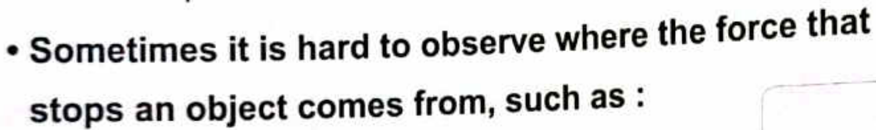
A moving object only stops when a force of the same amount is applied to it in th opposite direction of its motion.

- **Sometimes it is easy to observe where the force that stops an object comes from, such as :**

  A car crashes into a wall, it will stop because the wall applied a force to the car with the same amount of the force that pushes the car towards the wall.

- **Sometimes it is hard to observe where the force that stops an object comes from, such as :**

  A car runs out of fuel on a flat road, its speed decreases gradually until it stops.



  Because there is a friction force comes from :

  1. Friction (rub) between the car tires and the road.
  2. Friction between the air that flows over the car against its surface.

Friction :

It is a force that is exerted when objects rub against each other.

Notes

1. Friction force always slows down or stops motion of moving objects.
2. The direction of friction force is always opposite to the direction of motion moving object.

exerts	يبذل	runs out	ينفد / ينتهي	friction	
observe	يلاحظ	fuel	الوقود	tires	
crashes	يصطدم	gradually	تدريجيًا	rub	



Check your understanding

- Complete the following sentences using the words below :

(friction - opposes - unbalanced)

1. Any object moves from its place when the forces acting on it are ....
2. The force that slows down or stops motion is called ....
3. Friction is a force that .... motion.



Optional Digital Activity

Activity 9 **" Launching a Satellite "** in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

In the Assessment Book :
Try to answer :
Self-Assessment (25)

launching إطلاق satellite القمر الصناعى

Exercises on Lesson 3

● Understand ● Apply ● Analyze ● Evaluate ● Cre...

1 Choose the correct answer :

1. When you sit on a chair, the force of gravity is .... and holding you in the ch...
   a. pulling you upward
   b. pulling you downward
   c. pushing you upward
   d. pushing you downward
   (Cairo ...

2. What force makes a ball in the air fall down to the ground ? ....
   a. Friction.
   b. Gravity.
   c. Sound.
   d. Light.

3. Which of the following will cause an object to move ? .... (Luxor ...
   a. Balanced forces.
   b. Unbalanced forces.
   c. Sound energy.
   d. Light energy.

4. Two equal forces act at the same time on a stopping object but in opposite directions. Which sentence describes the object's motion ? ....
   a. The object speed increases.
   b. The object speed decreases.
   c. The object speed doesn't change.
   d. The object stays in its place without moving.

5. The force that tries to stop an object moving on a surface is called ....
   a. gravity.
   b. friction.
   c. push.
   d. pull.

6. There is a .... force between the car tires and the road that acts to decreas... its speed gradually. (Dakahlia 2...
   a. gravity
   b. friction
   c. pushing
   d. pulling

7. Which of the following sentences describes the friction force ? ....
   a. It pulls objects toward the ground.
   b. It pushes objects away from the ground.
   c. It slows down or stops objects in motion.
   d. It doesn't affect objects in motion.

2 Put (✓) or (✗) :

1. Unbalanced forces cause a change in the object position. (
2. When a car crashes into a wall, it will not stop. (
3. Sometimes it is easy to observe the force that stops an object. (
4. When a car runs out of fuel on a flat road, its speed increases gradually until it stops. (

5. Friction force always slows down or stops the motion of moving objects. ( )
6. Unbalanced forces keep an object in its place without moving. ( )

3 Correct the underlined words :

1. When you jump up, the force of friction pulls you back to the ground. (..................)
2. The rope in the tug-of-war game may not move towards any team, if both teams push with the same force. (..................)
3. Moving objects stop when a force of the same amount is applied to it in the same direction. (..................)
4. If a car runs out of fuel, its speed increases. (..................)
5. The motion of a car is opposed by the gravity of air. (..................)

4 Write the scientific term of each of the following :

1. It is a push or pull that is applied to an object causes it to change its position. *(Cairo 2022)* (....................)
2. It is a force that is exerted when objects rub against each other. (....................)
3. It is a force that slows down the motion of moving objects. (....................)

5 Complete the following sentences :

1. As you are sitting down on a chair, there are two forces that act on your body which are the .... force of gravity and the .... force of the chair.
2. The toy placed on a table does not move due to the effect of the two .... forces acting on it.
3. When you lift up an object from the ground, there are two forces act on it, which are the .... force of your hand and .... force of the gravity.
4. The speed of a ball moving on the ground decreases gradually until it stops due to the effect of .... force.
5. When you throw a ball up in the air, it starts to fall down again towards the ground due to the effect of pulling force of ....
6. A moving car is affected by the .... force of both air and road which act in the .... direction of the car movement.

6 Give reasons for :

1. When your toy car crashes into a wall, it will stop moving.

....

....

2. When you stop pedalling during the movement of your bicycle, it slows down until it stops.

....

....

● Understand ● Apply ● Analyze ● Evaluate ● Create

7 What happens if ... ?

1. You let your toy out of your hand.

....

....

2. You kick a football.

....

....

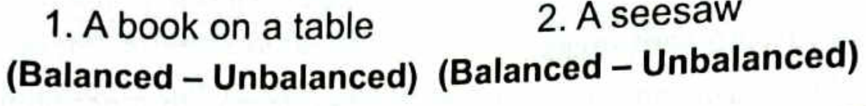
8 Look at the following pictures, then choose if the forces are "balanced" or "unbalanced" :



1. A book on a table



2. A seesaw



(Balanced – Unbalanced) (Balanced – Unbalanced)

9 Look at the following figure, then choose the correct answer :



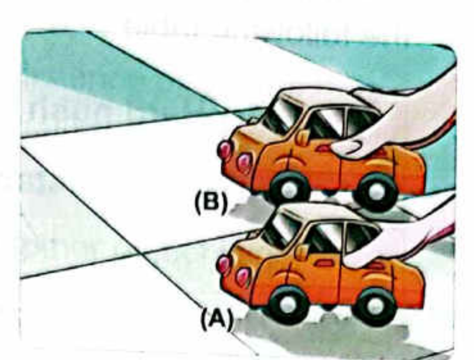
1. Among the forces that act on the basketball in this figure are ....
   a. pushing force of both gravity and the player's hand.
   b. pulling force of both gravity and the player's hand.
   c. pushing force of gravity and pulling force of the player's hand.
   d. pulling force of gravity and pushing force of the player's hand.

2. The basketball will fall down to the ground due to the .... that acts on it.
   a. pushing force of gravity
   b. pulling force of gravity
   c. friction force of air
   d. friction force of ground

LESSON 4

Activity 10 Rolling Cars

Look at the opposite figure, then choose the correct answer :

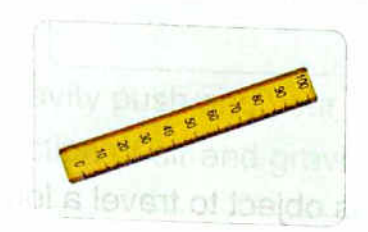


- If we roll the two cars with two different forces, where car (B) is pushed with a force greater than car (A).
- Which car travels a farther distance ? ....
  (Car (A) - Car (B))

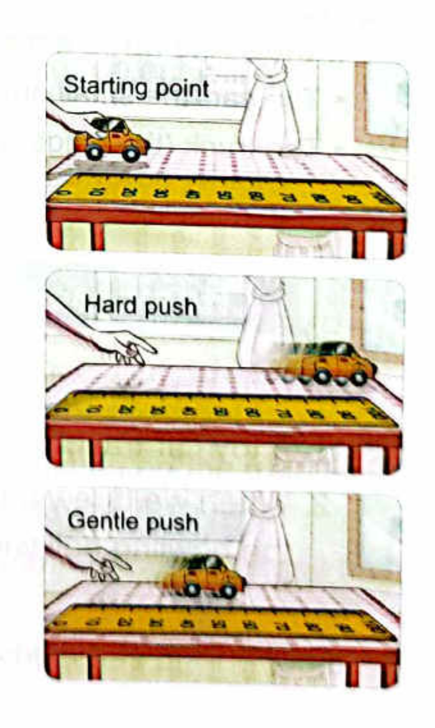
- **You have learned about the causes of motion, in this activity you will explore the effect of applying different amounts of force to an object.**

Tools


Toy car


Measuring ruler

Steps



1. Push a toy car hard from a starting point.
2. Record the distance the toy car rolls by using the measuring ruler.
3. Repeat step (1) and (2) several times, and record the data in a table, then find the average distance.
4. Push a toy car very gently from the same starting point.
5. Record the distance the toy car rolls.
6. Repeat step (4) and (5) several times, and record the data in another table, then find the average distance.

farther	أبعد	several times	عدة مرات	gently	بلطف / برفق		
explore	يكتشف	average distance	متوسط المسافة	data	بيانات		

Observations

- The car moves a large distance when it is pushed hard as shown in the following table :

Hard push	
Trial	**Distance (cm)**
1	90 cm
2	75 cm
3	80 cm
4	95 cm

The average distance = $\frac{90 + 75 + 80 + 95}{4} = 85$ cm

- The car moves a small distance when it is pushed gently as shown in the following table :

Gentle push	
Trial	**Distance (cm)**
1	14 cm
2	17 cm
3	20 cm
4	17 cm

The average distance = $\frac{14 + 17 + 20 + 17}{4} = 17$ cm

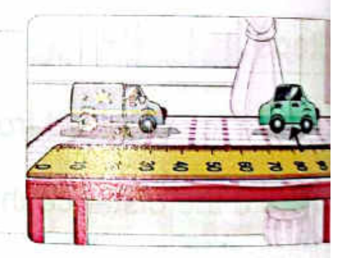
Conclusions

- Hard push causes object to travel a long distance.
- Gentle push causes object to travel a small distance.

Note

If the same force acts on a toy car and a toy truck :

- The car (the small object) will travel a farther distance.
- The truck (the bigger object) will travel a shorter distance.





Check your understanding

▶ **Put (✓) or (✗) :**

1. A toy car travels a very small distance when it is pushed hard. (   )
2. When we threw a bowling ball and a tennis ball in the air with the same force, the bowling ball will move faster. (   )

In the Assessment Book :
Try to answer :
Self-Assessment (26)

trial التجربة | gentle push دفعة خفيفة | tennis ball التنس
hard push دفعة قوية | bowling ball كرة البولنج

Exercises on Lesson 4

● Understand ● Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

1. Tamer pushes a ball on a flat ground and it covers a distance of 30 cm. If he pushes it with more force, it may cover a distance equal to .... cm.
   a. 5 b. 15 c. 30 d. 50
2. The force that occurs when an object rubs against another object is called ....
   a. friction. b. gravity. c. push. d. pull. *(Minia 2022)*
3. Each of your father and your young brother take turns to push you hard on the swing, the hand pushing force of your father will be .... that of your brother.
   a. less than. b. the same as.
   c. more than. d. weaker than.
4. When we throw a ball into the air, it falls downward. During its falling it is affected by two forces which are ....
   a. friction of air and gravity push. b. gravity push and your pull.
   c. your push and gravity pull. d. friction of air and gravity pull.

2 Put (✓) or (✗) :

1. The motion of an object on the ground is affected by a friction force. ( )
2. Hard push causes an object to travel for a longer distance. ( )
3. If the same force acts on two different objects so, the bigger object will travel for a longer distance. ( )
4. A football rolls on the ground to a distance then it stops. The force which stops the ball is the gravitational force. ( )

3 Complete the following sentences :

1. When you kick a ball hard, it will move for a .... distance. But, when you kick the same ball gently, it will move for a .... distance.
2. We can say that a train is faster than a car if the .... acting on the train is .... than that acting on the car to move the same distance.
3. If you push each of a small ball and a big ball with the same force, the small ball moves a distance .... than the big ball.
4. In tug-of-war game, the rope moves toward the group which has pulling force .... than the other group.
5. If the same pulling force acts on two boxes of different sizes, the smaller box will move for a .... distance.

4 Give reasons for :

1. If you push two similar toy cars on the same ground, one of them may trav
   a longer distance than the other.

   ....

2. If the same force acts on a small car and a truck, the small car will travel fo
   a longer distance than the truck.

   ....

   ....

5 What happens if you push two similar balls with different forces on the grou

....

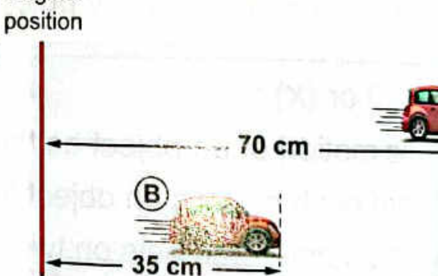
....

6 The following figure shows two similar toy cars are pushed to move on the same floor, study the figure then answer the questions below :

1. Which of these two cars is affected by a greater force ? *(Cairo 2022)*
   (Give a reason for your answer).

   ....

   ....



2. **Choose the correct answer :**

   1. If the two cars were pushed by the same force, so ....
      a. car (A) would move for a longer distance than car (B).
      b. car (B) would move for a longer distance than car (A).
      c. the two cars would move the same distance.
      d. the two cars would not move.
   2. If you replace car (A) with a new car which is larger than car (B), the new will move a distance .... the distance covered by car (B).
      a. longer than
      b. shorter than
      c. equal to
      d. twice
   3. The two cars during motion are affected by all the following forces except ....
      a. the pushing force.
      b. the friction force of the air.
      c. the friction force of the floor.
      d. the pushing gravity force.

LESSON 5

Activity 11 Energy, Work and Force

▸ Look at the opposite picture, then choose the correct answer:

• The car moves when a .... force acts on it.

(pushing – pulling)



The relationship between energy, work and force :

• To make an object start or stop moving, this requires a force (either a push or a pull).

• Applying this force to the object requires energy.

▸ **The following example shows the relationship between energy, work and force :**

- Imagine you had to push a car along a flat road so, this needs a lot of force.
- When you push the car, the energy transfers from your body to the car due to the force that your body exerts on the car.
- When you move the car, you are doing work.



▸ **From the previous example, we can conclude that :**

• Force transfers energy from one object to another.

• The work done is equal to the amount of energy transferred by a force that is used to move an object.

Force → Transfers → **Energy** → Enables us to do → **Work**

Note

Force and energy are different, but they are related to one another, where force is the effect that changes energy and turns it into work.

Check your understanding

▸ Complete the following sentences using the words below :

(force – work)

1. To make an object start or stop moving, this requires ....
2. When you push a car and it starts to move, you are doing ....

relationship	صلة	requires	يحتاج	enables us	تمكننا
energy	طاقة	flat road	طريق مسطح	related to	متعلق بـ
work	شغل	transfers	ينتقل / يتحول		

Activity 12 Record Evidence Like A Scientist

- In this concept, you have learned a lot about the role of balanced and unbalanc forces in starting and stopping motion.
- **Now,** try to think like a scientist by writing your claim, your evidence and your scientific explanation about one of the main points of this concept through the fo steps you have learned in the previous concepts.

Step 1 The Question

How do forces act on different objects to make them start moving and stop moving ?

Step 2 My Claim

....

....

....

Step 3 My Evidence

....

....

....

....

Step 4 My Scientific Explanation

....

....

....

....

....

role	وظيفة / دور	evidence	
claim	افتراض	scientific explanation	التفسير العلمي

Activity 13 Review : Starting and Stopping

We can summarize this concept in the following main points :

- The shockwave truck has been fitted with three jet engines, so that it is about five times faster than the normal truck.
- To stop the shockwave truck, the engineers installed three parachutes that the driver opens to help slow down the truck quickly.

- **There are two forces that cause objects to move which are :**
  - Pushing force.
  - Pulling force.
- Air can move objects such as leaves on a tree that move by the wind blowing.
- When some engineers fix fire extinguishers onto a cart, then release air from the fire extinguishers, the air moves backword that makes the cart begines to move forward.

- If balanced forces act on an object, it will not move.
- If unbalanced forces act on an object, it will move towards the greater force.

Motion :

It is any change in the position of an object relative to a fixed point.

Gravity :

It is the force that pulls objects down toward the Earth.

- Some motion is easy to see such as a person walking down the street.
- Some motion is hard to see such as the rotation of Earth around the Sun.

Force :

It is a push or pull that is applied to an object causes it to change its position.

- Moving object only stops when a force of the same amount is applied to it in the opposite direction of its motion.

Friction :

It is a force that is exerted when objects rub against each other.

- Friction force always slows down or stops motion of moving objects.
- The direction of friction force is always opposite to the direction of motion of a moving object.

- Hard push causes object to travel a long distance.
- Gentle push causes object to travel a small distance.
- **If the same force acts on a toy car and a toy truck :**
  - The car (the small object) will travel a farther distance.
  - The truck (the bigger object) will travel a shorter distance.

- Force transfers energy from one object to another.
- The work done is equal to the amount of energy transferred by a force that is us to move an object.



In the Assessment Book :
Try to answer :
- Self-Assessment (27)
- Model Exam on Concept (2.1

Exercises on Lesson 5

● Understand ● Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

1. All of the following examples can move by a pushing force except ....
   a. a ball. b. a swing.
   c. tug-of-war rope. d. a car.
2. To stop a moving object we can apply a .... against it.
   a. pushing force b. gravity force c. sound energy d. light energy
3. Samir pushed his toy car that moved forward, to stop it he should ....
   a. push it in the same moving direction.
   b. pull it with a small force in the same moving direction.
   c. pull it with a large force in the same moving direction.
   d. push it in a direction opposite to its moving direction.
4. The work done is equal to the amount of .... transferred by a force that is used to move an object.
   a. energy b. friction c. pushing d. gravity

2 Put (✓) or (✗) :

1. If a person moves a table through a distance, there is a work done. ( )
2. Lifting a book upward needs more energy than pushing a truck. ( )
3. If you try to open a door but you cannot open it, this means that work is done. ( )
4. Hitting a tennis ball needs a pulling force. ( )

3 Complete the following sentences :

1. When you push a table to move on the floor, the .... transfers from your body to the table.
2. Any force applied to an object is considered as the effect that changes .... and turns it into .... done by this object.
3. The work done on a basketball is equal to the amount of .... transferred from the player hand to the ball.
4. To stop the rolling ball on the ground, you need to exert a force .... than the force exerted by the ball.

4 In the opposite figure, which of the two players does more work to raise the weights ? (Give a reason for your answer).

....

....

50 kg 70 kg

First player Second player

Model Exam on Concept (2.1)

● Understand ● Apply ● Analyze ● Evaluate ● Create

1 **(A) Choose the correct answer :**

1. Mona throws her ball up in the air so, gravity will make the ball move ....
   a. forward. b. upward.
   c. downward. d. backward.
2. Which situation represents the best example of gravity ? ....
   a. A car hits a tree and its motion stops.
   b. A wind blows and a sailboat moves.
   c. A book is pushed to move across a table.
   d. A person drops a ball that falls to the ground.
3. The speed of the Shockwave truck is more than that of the ....
   a. normal truck only.
   b. jet airplane only.
   c. normal truck and rocket.
   d. normal truck and jet airplane.
4. All the following are examples of pushing force except ....
   a. writing using a keyboard. b. lifting a bag.
   c. kicking a ball. d. throwing a basketball.

(B) What happens if ... ?

The forces that are acting on the rope of tug-of-war game are balanced ?
(according to the movement of the rope)

....

2 **(A) Put (✓) or (✗) :**

1. Gravity pulls objects upward. ( )
2. The main difference between pulling and pushing forces is the direction of the force. ( )
3. We can't observe the movement of a person walking on the street. ( )
4. If you move a chair through a distance, there is work done. ( )

(B) Give a reason for the following :

If you push a pen on the table, it moves for a certain distance till it stops.

....

....

3 (A) Complete the following sentences :

1. When we put a jet engine in a normal truck, its speed will ....
2. The bicycle cannot move without a .... acting on it.
3. When you push a toy car on the ground, its speed decreases gradually until it stops due to the effect of .... force.
4. To stop a moving toy truck on the ground, you need to exert a force .... than that exerted by the toy truck.

(B) Classify the following actions in the table below according to the needed force :

1. Typing on a keyboard.
2. Lifting a bag.
3. Moving a chair away from you.
4. Kicking a football.
5. Closing your room's door from inside the room.
6. Opening the door of a refregirator.

Pulling force	Pushing force
....	....
....	....
....	....
....	....
....	....

4 (A) Correct the underlined words :

1. By increasing the pushing force acting on a moving toy car, it will move for a short distance. (...................)
2. Any moving object stops when a force of the same amount is applied on it in the same direction of its movement. (...................)
3. To increase the speed of Shockwave truck, engineers installed three parachutes in it. (...................)
4. A table stays without any motion due to the unbalanced forces that are acting on it. (...................)

(B) Look at the opposite figure, then complete the following sentences :

1. The person in this figure use .... to land safely.
2. The idea of person landing in this figure is the same as the idea of stopping the motion of .... and ....

Concept 2.2 Energy and Motion



Learning outcomes

By the end of this concept, your child will be able to :

- Investigate the forms of energy in a system or for an object.
- Apply logical reasoning to predict the types of energy for an object.
- Cite evidence to explain how energy is conserved.

Key vocabulary

- Kinetic energy
- Potential energy
- Chemical energy
- Gravitational potential energy
- Thermal energy

Notes For Parents On Concept [2.2]

Lessons	Activities	What you should do with your child
1	Activity 1	Let your child mention some examples of objects that have kinetic energy and potential energy.
	Activity 2	Discuss with your child the different types of energy in the roller coaster during its movement.
	Activity 3	Optional digital activity.
2	Activity 4	Discuss with your child the different forms of energy and let him/her mention some examples of each of them.
	Activity 5	Explain to your child the relationship between energy and work.
	Activity 6	Explain to your child the meaning of "potential energy" and "kinetic energy".
3	Activity 6	Explain to your child the meaning of "force" and its effect in our daily life.
	Activity 7	- Explain to your child that all forms of energy are classified into two main groups which are potential energy and kinetic energy. - Discuss with your child that potential energy depends on the mass of an object and its height from the Earth's surface.
	Activity 8	Let your child mention the changes of energy in some devices.
	Activity 9	Optional digital activity.
4	Activity 10	Optional digital activity.
	Activity 11	Explain to your child the concept of : "energy is not created or destroyed".
5	Activity 12	Help your child to think like a scientist by answering a question about one of the main points of this concept, then write his/her claim, evidence and scientific explanation.
	Activity 13	Optional digital activity.
	Activity 14	Let your child review the main points in this concept.





Can You Explain ?

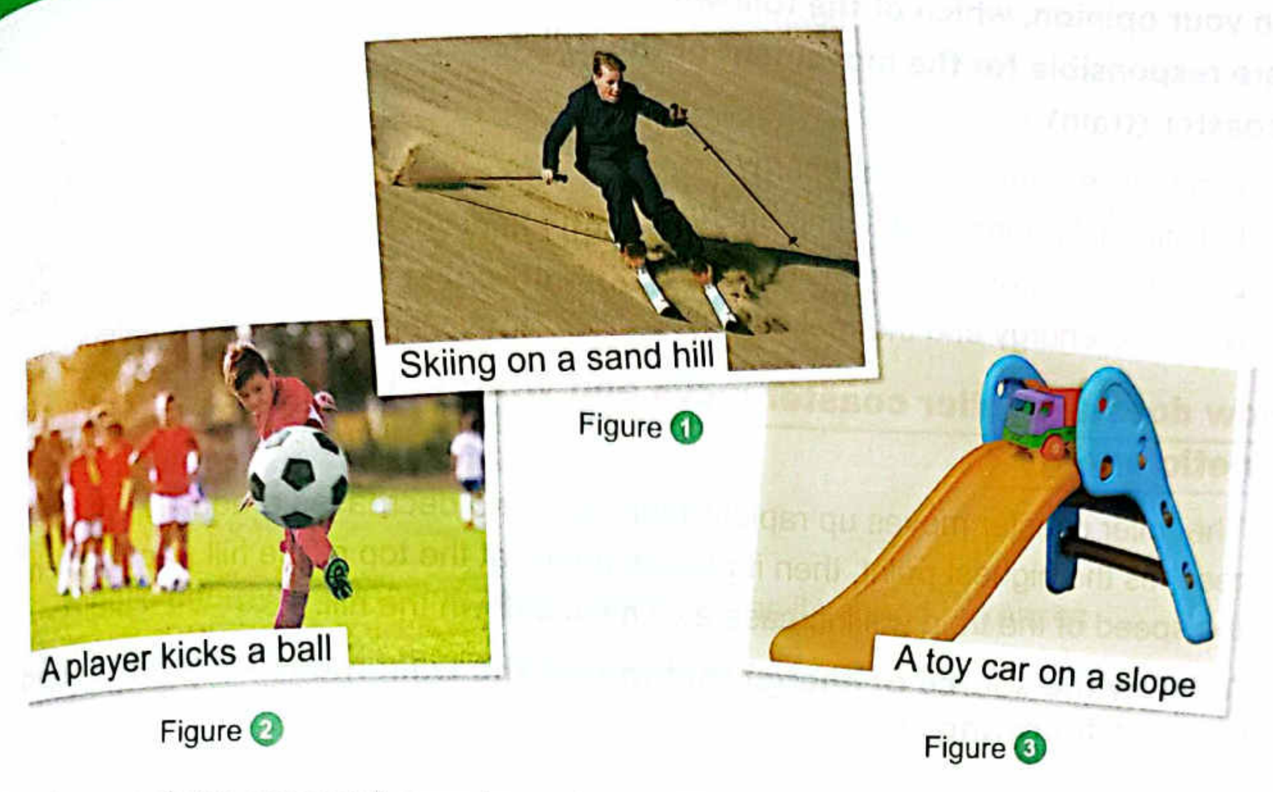


Figure 1 Figure 2 Figure 3

In the previous concept, you have learnt that :

Objects need a force to move or stop and this force on objects needs energy to be able to do work, so how do moving objects get energy ?

- In figure 1, A sand surfer moves very fast down the sand hill.
- In figure 2, The ball moves through the air when the player kicks it with his foot.
- In figure 3, The toy car at the top of slope will not move if no force is applied on it.

From the previous observations, we can conclude that :

- All moving objects have a type of energy known as kinetic energy.
- Objects that do not move don't have kinetic energy but they have another type of energy known as potential energy that is stored inside them, when these objects start to move, they get kinetic energy.

In this concept, we will study :

- The meaning of energy and its basics.
- Types of energy.
- Kinetic energy and potential energy.
- Energy transformation in engines.

skiing	التزحلق	force	قوة	kinetic energy	طاقة حركة	engines	محركات
hill	تل	energy	طاقة	potential energy	طاقة وضع		
slope	منحدر	sand surfer	مُتزلج على الرمال	transformation	تحول		

Activity 2 Roller Coasters

In your opinion, which of the following energies are responsible for the movement of the roller coaster (train) ?

a. Kinetic energy and light energy.
b. Potential energy and sound energy.
c. Electric energy and kinetic energy.
d. Sound energy and thermal energy.

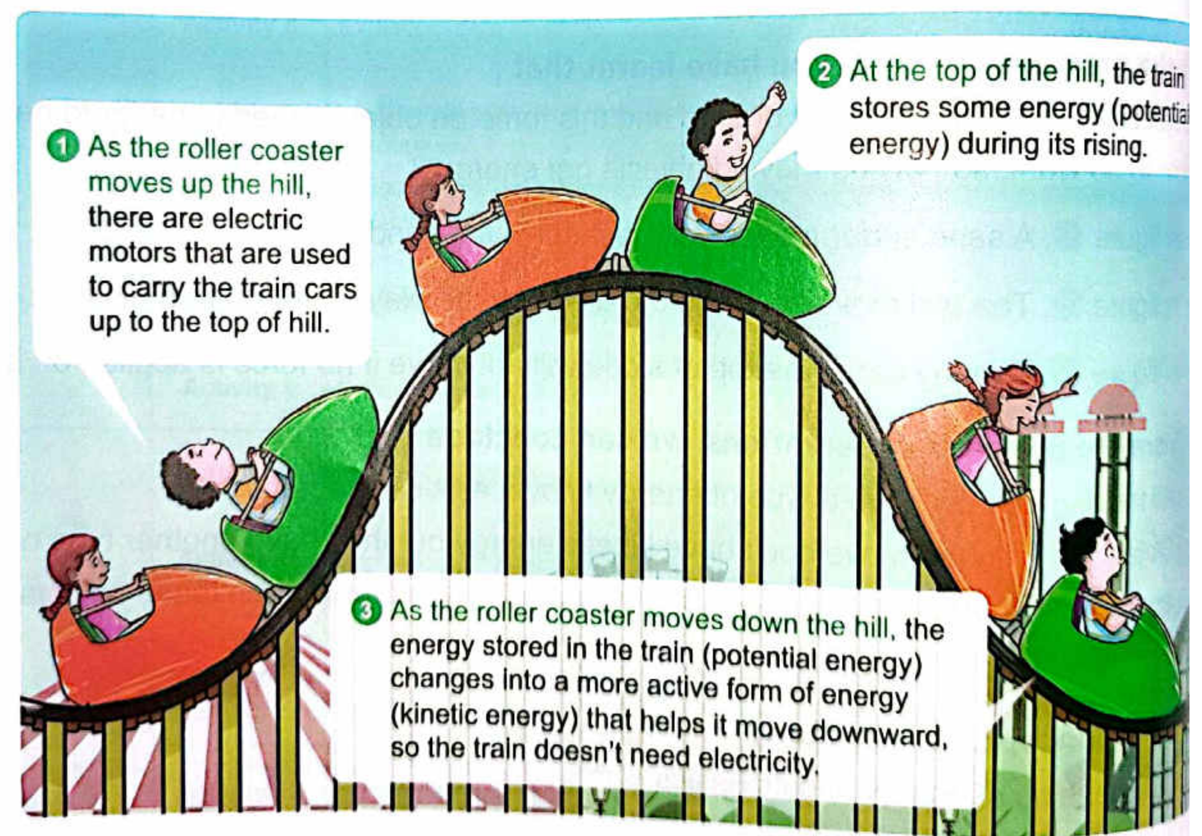


Roller coaster

How does the roller coaster move and what is the source of its kinetic energy ?

The roller coaster moves up rapidly, then its speed decreases gradually until it reaches the highest point, then it pauses briefly at the top of the hill (ramp), then the speed of the train will increase as it moves down the hill.

- **To know the source of energy that makes the train move with this speed read the following steps :**



Note

While the roller coaster moves down the hill, the kinetic energy increases as its speed increases.

roller coaster	قطار الملاهى السريع	thermal energy	
electric energy	طاقة كهربائية	briefly	

From the previous explanation, we can conclude that :

- When the roller coaster moves downward, its kinetic energy increases.
- The kinetic energy increases as the speed increases.

What happens if ... ?

- **A roller coaster moves from up to down. (according to its energy).**
  The stored potential energy in the train is changed into kinetic energy.
- **A roller coaster stops. (according to its kinetic energy).**
  Its kinetic energy becomes zero.

Check your understanding

Put (✓) or (×) :

1. Kinetic energy of a moving object increases as its speed increases. ( )
2. When a roller coaster moves from up to down, it has the most kinetic energy when it reaches the lowest point of the hill. ( )
3. When the roller coaster moves downward, its kinetic energy decreases. ( )

Optional Digital Activity

Activity 3 " **Energy in the Classroom** " in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

In the Assessment Book :
Try to answer :
Self-Assessment (28)

Exercises on Lesson 1

● Understand ● Apply ● Analyze ● Evaluate ● Crea

1 Choose the correct answer :

1. When a sand surfer moves down the hill, this means that he has ...., due his movement.
   a. kinetic energy
   b. stored light energy
   c. potential energy
   d. stored electric energy

2. The speed of the roller coaster when it goes up, ...
   a. is equal to its speed when it goes down.
   b. is less than its speed when it goes down.
   c. is more than its speed when it goes down.
   d. increases as it reaches the top of the hill.

3. When wheelchair and a car go up a ramp, which of them can store some energy ? ....
   a. The wheelchair only.
   b. The car only.
   c. Both of them.
   d. None of them.

4. Electric motor in the roller coaster helps it to ....
   a. move up to the top of the hill.
   b. move down to the bottom of the hill.
   c. stop at the top of the hill.
   d. stop at the bottom of the hill.

5. When an object moves down a ramp, its stored potential energy ....
   a. increases.
   b. doesn't change.
   c. changes to a less active form of energy.
   d. changes to a more active form of energy.

(Assuit 2

6. The roller coaster has the most energy of motion, ...
   a. as it goes up to the top of the hill.
   b. as it goes down the hill.
   c. when it stops at the top of the hill.
   d. when it stops at the bottom of the hill.

7. When the roller coaster stops, its energy of motion ....
   a. doesn't change.
   b. increases.
   c. decreases.
   d. becomes zero.

8. When a car moves up a ramp, this happens due to the effect of ....
   a. gravity force.
   b. balanced force.
   c. kinetic energy.
   d. sound energy.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. When a wheelchair goes down a ramp, 2. When a wheelchair stops at the top of a ramp, 3. When a wheelchair stops at the bottom of a ramp,	a. it is under the effect of balanced force, and doesn't store energy. b. it has only energy of motion. c. it is under the effect of unbalanced force, where it loses its stored energy. d. it is under the effect of balanced force, and it stores energy.

1. .... 2. .... 3. ....

3 Put (✓) or (✗) :

- 1. When a stopped object is affected by two opposite equal forces it will not move. (   )
- 2. If a wheelchair moves horizontally on the ground, its energy of motion equals zero. (   )
- 3. The moving objects only have energy, while the objects that don't move have no energy. *(Giza 2022)* (   )

4 Write the scientific term of each of the following :

- 1. The form of energy that the object has due to its movement. (......................)
- 2. The form of energy that increases when the speed of an object increases. *(Sohag 2022)* (......................)

5 Correct the underlined words :

1. When a roller coaster moves down a ramp, its kinetic energy doesn't change. (......................)
2. If you push a pencil upward, it stops at a certain height then falls down due to the effect of pushing force of gravity. (......................)
3. When an object moves down, it has more active form of energy known as potential energy. (......................)
4. Under the effect of pushing force of gravity, anything falls down to the ground. (......................)
5. Balanced forces cause stopped objects to move. (......................)

6 Complete the following sentences :

- 1. When the roller coaster starts to move, it gets energy from .... found in its first car which is operated by ....
- 2. The speed of a roller coaster when it moves toward the top of the hill is .... than that when it moves down the hill.
- 3. If the speed of an object decreases this means that its kinetic energy ....
- 4. When the roller coaster moves up to the top of the hill, ... and .... energies cause its motion.

7 Give reasons for :

- 1. The roller coaster doesn't need electricity during its movement down the hill.
  ....
  ....
- 2. The speed of the roller coaster increases as it moves down the hill.
  ....
  ....

8 What happens if ... ?

1. Roller coaster moves down the hill. (according to the change of energ
   ....
   ....
2. The roller coaster loses its kinetic energy.
   ....
3. If a stopped ball at the top of a ramp starts to move down. (according to its energy
   ....

9 Look at the following figure, then choose the correct answer :

1. The speed of the car increases when it ....
   a. stops at point (A).
   b. moves from (A) to (B).
   c. stops at point (C).
   d. moves from (B) to (C).
2. The speed of the car decreases when ....
   a. it moves from (A) to (B).
   b. its kinetic energy doesn't change.
   c. its kinetic energy increases.
   d. it moves from (B) to (C).
3. The kinetic energy of the car increases in all the following cases except when the car ....
   a. moves from (A) to (B).
   b. moves from (C) to (D).
   c. moves from (B) to (C).
   d. speed increases.

LESSON 2

Activity 4

What Do You Already Know About Energy and Motion ?

- Observe these pictures, then put (✓) in front of the objects that have energy.







- **From the previous pictures, you can observe that we need energy to do all our daily activities such as running, walking and even during reading a book.**

So, energy is part of everything that happens in the world and everything we do.

- **Examples show the importance of energy in our life :**

1. We eat food to obtain energy to help us grow and move.



2. Energy affects objects and makes them move and change their places.



3. Energy helps in operating all electric devices.

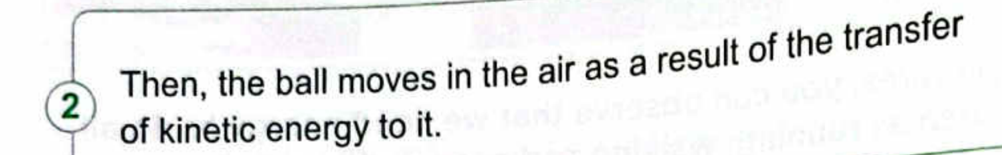


4. Energy helps in cooking.

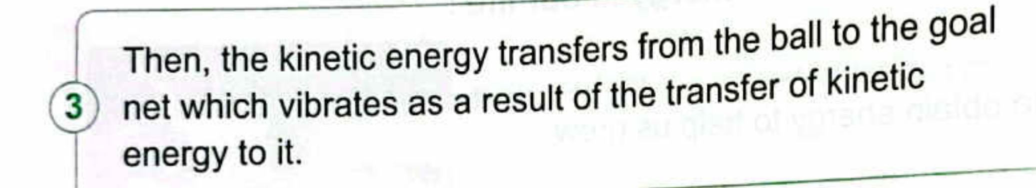


Moving Energy :

- **Energy moves (transfers) from an object to another as in the example below that shows a player kicks a ball as shown in the following steps :**



1. The kinetic energy transfers from the player's foot to the ball when he kicks it.



2. Then, the ball moves in the air as a result of the transfer of kinetic energy to it.



3. Then, the kinetic energy transfers from the ball to the goal net which vibrates as a result of the transfer of kinetic energy to it.

Note

Any stopped object on the Earth's surface as in figure (1) has no energy, while any object at a height from the Earth's surface as in figure (2) has a special type of energy known as potential energy.



Figure (1) Figure (2)



Check your understanding

▶ **Put (✓) or (×) :**

1. Energy affects objects and makes them move and change their places. ( )
2. Energy doesn't transfer from an object to another. ( )

 transfers ينقل kicks

Activity 5 Energy Basics

- **From the previous concept, you have learned that there is a relation between energy, force and work, where :**
- Force is something that changes energy to make it able to do work.
- **So, we can define energy and work as follows :**

Energy:
It is the ability to do work or cause change.

Work:
It is a force that causes an object to move a distance.

- **Example to show the relation between energy and work :**
  - When a football player kicks a ball, the force of his kick causes the ball move in a different direction.
  - Thus the player does work and he consumes energy (that he had obtained from food) to move his leg.
  - So, the work done by this player causes the ball to move.



Facts about energy :

1. **Energy can be stored and changed from one form into another.**

   Example :
   When you hold a ball, it stores potential energy, when you let it falls down to the ground, the ball is moving where the potential energy stored in it is changed into kinetic energy.



2. **Most forms of energy can't be seen.**

   Example :
   Sound energy, thermal energy, electrical energy and chemical energy are forms of energy that can't be seen.



basics
work
relation
أساسيات consumes
شغل facts
يستهلك hold
حقائق store
يمسك
يخزن

③ We can see and measure what energy can do.

Example :
When you push a wooden box and this box moves, this means that the energy transfers from you to the box and also can be measured through the distance that the box moves.





Check your understanding

▸ **Complete the following sentences :**

1. The ability to do work is known as ....
2. The force that causes an object to move a distance is known as ....

▸ **Put (✓) or (×) :**

1. Energy doesn't change from one form into another form. (
2. When you push a wall and this wall doesn't move, this means that you does work. (
3. The person who pushes a car forward and this car moves, this means that the person consumes energy. (

 measure يقيس distance

Activity 6 Kinetic and Potential Energy

• Scientists classify energy into two types which are :



It is the amount of energy that is stored in an object due to its position.



Example :
The ball has potential energy stored in it when you lift it up away from the Earth's surface.



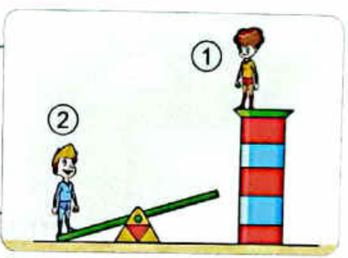
It is the energy of an object due to its motion.



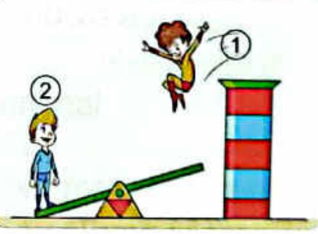
Example :
The ball has a kinetic energy when you let it fall down to the ground.

• **Now, let's see an example to find out how the potential energy can be changed into kinetic energy.**

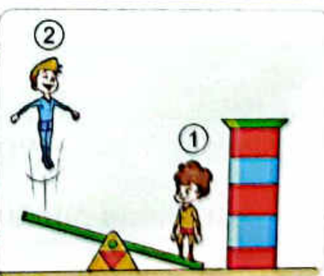
1. Acrobat (1) on the tower has potential energy.



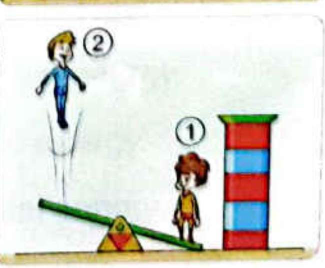
2. When he jumped down, his potential energy is converted into kinetic energy.



3. The kinetic energy of acrobat (1) transfers to acrobat (2) who is standing on the seesaw and causes him to be pushed up into the air.



4. During the movement of acrobat (2) up in the air, his kinetic energy is converted gradually into potential energy.



Notes

1. When an object has potential energy, so this object is ready to do work or to be active.
2. As the height of an object from the Earth's surface increases, potential energy stored inside this object increases.

Check your understanding

Complete the following sentences :

1. Scientists classify energy into two types which are .... energy and .... energy.
2. The object has .... energy stored in it when you lift it up away from the Earth's surface.
3. Potential energy .... by increasing the height of the object from the Earth's surface.

In the Assessment Book
Try to answer :
Self-Assessment (29)

 height ارتفاع earth's surface سطح الأرض

Exercises on Lesson 2

Understand · Apply · Analyze · Evaluate · Create

1 Choose the correct answer :

1. Human needs .... to walk from one place to another.
   a. light energy
   b. energy obtained from food
   c. sound energy
   d. energy obtained from batteries

2. When you throw a stone in a lake, the .... is transferred from the stone to the water surface.
   a. potential energy
   b. pulling force
   c. gravity force
   d. kinetic energy

3. A stopped object placed at 10 meters high from the Earth's surface has .... than the same object when placed at 5 meters high.
   a. smaller potential energy
   b. larger potential energy
   c. smaller kinetic energy
   d. larger kinetic energy

4. When a ball on a certain height is left to fall down, ...
   a. its kinetic energy changes into potential energy.
   b. its potential energy changes into kinetic energy.
   c. its potential energy remains as it is.
   d. its kinetic energy remains as it is.

5. The form energy that can be seen is .... energy.
   a. thermal
   b. electric
   c. light
   d. sound

6. The energy that is stored in an object due to its position, is known as .... energy. *(Alexandria 2022)*
   a. kinetic
   b. potential
   c. electric
   d. chemical

2 The following table shows Samy in different situations. Choose from column (B) the type and the amount of energy that suits each situation in column (A) :

(A)	(B)
1. Samy stops at 20 meter high	a. he has a stored electrical energy.
2. Samy stops at 5 meter high	b. he does not have potential or kinetic energies.
3. Samy stops on the ground	c. he has a large amount of kinetic energy.
4. Samy walks slowly on the Earth's surface	d. he has a small amount of potential energy.
5. Samy runs fast on the Earth's surface	e. he has a small amount of kinetic energy.
	f. he has a large amount of potential energy.

1. .... 2. .... 3. .... 4. .... 5. ....

3 Put (✓) or (✗) :

- 1. We eat food to obtain energy. (
- 2. Energy doesn't transfer from an object to another. (
- 3. Any moving object has a form of energy known as kinetic energy. (
- 4. When an object is left to fall down to the Earth's surface, its potential energ is changed into kinetic energy. (
- 5. We can measure the distance that an object moved as a result of pushing force. (
- 6. To do work, you must push or pull an object for a certain distance. (
- 7. As the height of an object from the Earth's surface increases, its potential energy decreases. *(Sharkia 2022)* (
- 8. When an object moves faster, it gains a larger amount of kinetic energy. (

4 Write the scientific term of each of the following :

- 1. The energy that is stored in an object due to its position at a certain height from the Earth's surface. *(Cairo 2022)* (..........
- 2. The energy that the object gains due to its motion. *(Minia 2022)* (..........
- 3. The ability to do work or cause change. *(Ismailia 2022)* (..........
- 4. The force that makes an object to move over a distance. (..........
- 5. The energy that is changed into kinetic energy when an object falls down to the Earth's surface. (..........

5 Correct the underlined words :

1. Your <u>potential</u> energy is transferred from your foot to a ball when you kick it. (..........
2. The ability to do <u>force</u> or cause change is known as energy. (..........
3. We cannot see all forms of energy, except <u>thermal</u> energy. (..........
4. As the object moves faster, its <u>potential</u> energy increases. (..........
5. The energy form stored in a stopped wooden box placed on a table is <u>kinetic</u> energy. (..........

6 Complete the following sentences :

1. If you have the ability to push a chair, so you have ....
2. When a force moves a ball moves over a distance we can say that .... is done.
3. When you kick a ball, the .... energy of your foot transfers to it. So, it moves through the air.
4. When an apple falls from a tree, its .... energy will decrease.
5. Some types of energy can be seen such as .... energy, while some other types of energy can't be seen such as .... and .... energies.
6. If an object is placed at a height above the Earth's surface, it stores .... energy.
7. If a bird flies from the ground up to a high tree, its potential energy will ....
8. If you move a bag placed on a table to the floor, its potential energy will ....

7 Give reasons for :

1. The goal net vibrates when a ball hits it.

....

2. A bird stops on a tree has energy.

....

....

3. When a stone is thrown upwards, its potential energy increases.

....

8 What happens if ... ?

1. An object is placed at a height from the Earth's surface. (according to its potential energy).

....

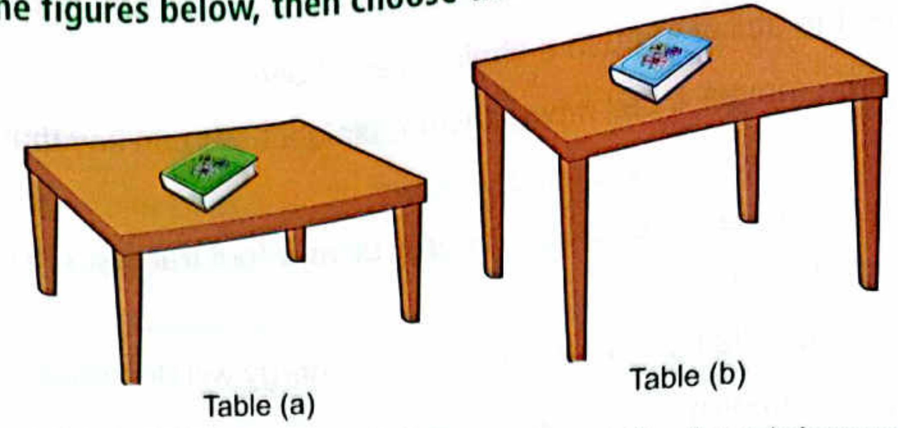
2. An apple falls from a tree to the ground. (according to the change in its energy).

....

3. You transfer a book from a lower shelf to a higher shelf. (according to its potential energy).

....

9 **Look at the figures below, then choose the correct answer :**



1. According to the potential energy, which of the following statements is correct ? ....
   a. The two books have the same potential energy.
   b. The book on table (a) has more potential energy.
   c. The book on table (b) has more potential energy.
   d. The two books have no potential energy.

2. If you transfer the book on table (a) onto table (b), its potential energy will ......
   a. increase. b. decrease. c. not change. d. be zero.

10 **Look at the two opposite figures, then choose the correct answer :**

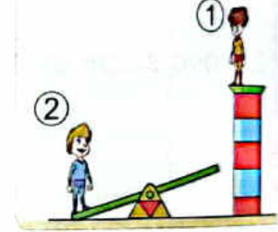


Figure (a)

1. In figure (a), the acrobat (1) has ....
   a. potential energy more than that of acrobat (2).
   b. potential energy less than that of acrobat (2).
   c. potential energy similar to that of acrobat (2).
   d. no potential energy like acrobat (2).

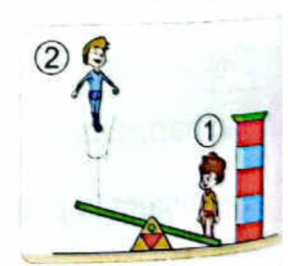
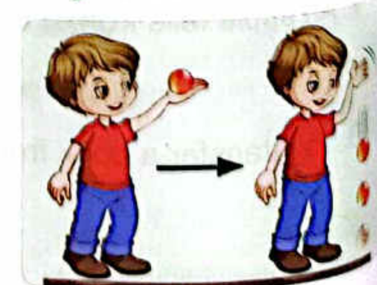


Figure (b)

2. In figure (b), during the rising up of the acrobat (2) into the air, his ....
   a. potential energy decreases.
   b. potential energy increases.
   c. potential and kinetic energies increase.
   d. potential and kinetic energies decrease.

11 **Look at the opposite figure, then complete the following sentences :**



1. When the boy lets the ball fall down, the .... energy which is stored in the ball changes into .... energy.
2. When the ball hits the floor and bounces up, its .... energy will increase as it rises up.

LESSON 3

Activity 7

Forms of Potential and Kinetic Energy

▸ Complete the sentences below each picture by writing **potential** or **kinetic**.



1. The ball has .... energy.



2. The moving bike has .... energy.

Forms of potential energy

1 Gravitational potential energy

as

The stored energy in a roller coaster at the top of a hill



2 Chemical potential energy

as

The stored energy in batteries.



Notes

1. The chemical energy in the battery is not used until this battery is connected to a device.
2. When a spring is compressed, it stores potential energy inside it.



Battery



Spring

gravitation	الجاذبية	spring	زنبرك
connected	متصلة	compress	يضغط

Factors affecting potential energy of an object :

1 Mass

By increasing the mass, the potential energy increases.

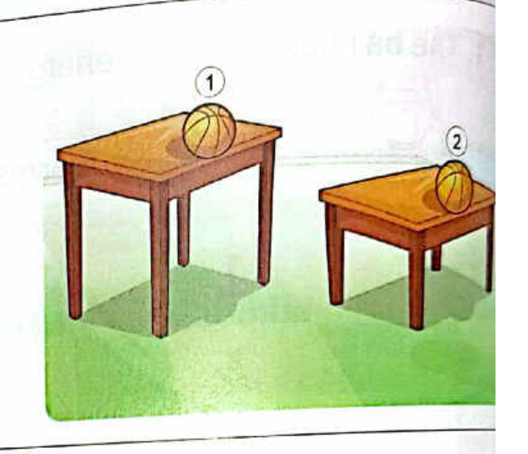
Example :
Ball (1) that has mass of 500 gram has a greater potential energy than ball (2) that has mass of 40 gram.



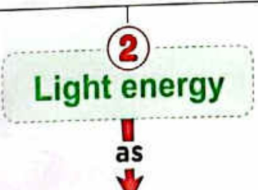
2 Height

By increasing the height from the Earth's surface, the potential energy increases.

Example :
Ball (1) at height 1 metre has a greater potential energy than ball (2) at height $\frac{1}{2}$ metre.



Forms of kinetic energy

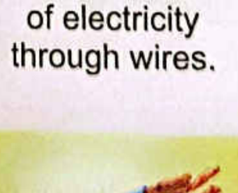


1. **Sound energy** as Movement of sound waves in the air.

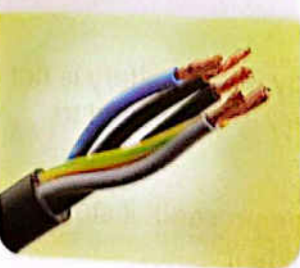


2. **Light energy** as Movement of light waves in the air.





3. **Electrical energy** as Movement of electricity through wires.





4. **Thermal energy** as Vibration of particles in a substance during heating.



mass كتلة
sound waves موجات الصوت
light waves موجات الضوء
vibration

- From the previous lessons, you have known that energy is transformed (changed) easily from one form into another form such as :

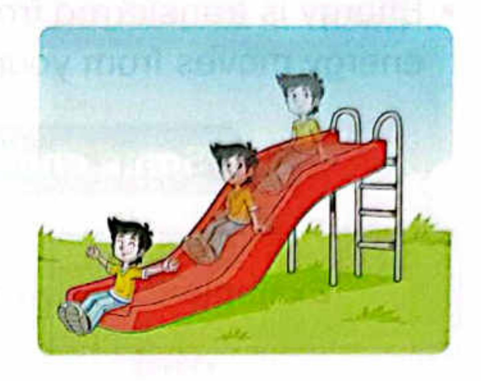
Changing of potential energy into kinetic energy.

Example 1 :



- A child at the top of a playground slide has potential energy.

- When the child moves down along the slide, the **potential energy changes into kinetic energy.**



Example 2 :

- When the roller coaster is at the top of the hill, it stores potential energy.

- When it goes down the hill, its **potential energy changes into kinetic energy**.



Check your understanding

- Look at the opposite picture, then complete the sentences using these words :

(gravity – kinetic – potential)



1. The force that pulls the egg to the ground is ....
2. The egg has .... energy as it falls down.
3. The egg got .... energy when it was in the boy's hand.

playground ملعب slide زحليقة pick up يرفع

Activity 8 Types of Energy

- Energy is found everywhere around us.
- Energy is continuously changing and transforming from one form into another form.
- Energy is transferred from one place to another (such as when you kick a ball, energy moves from your leg to the ball).

Some changes of potential energy into kinetic energy

Example	Source of energy	Energy changes	
		From	Into
Flashlight	Batteries	Chemical energy	Light energy and thermal energy.
Gas oven	Natural gas	Chemical energy	Thermal energy.
Spring-powered car toy	Spring wire	Potential energy	Kinetic energy, sound energy and thermal energy.
Normal car	Gasoline	Chemical energy	Kinetic energy.

▶ **From the previous explanation, we can conclude that :**

- Energy can be stored in many different forms.
- New energy cannot be created and also existing energy cannot be destroyed.

oven	فرن	gasoline	بنزين	destroy
natural gas	غاز طبيعي	create	يخلق	

Note
The food you eat also stores chemical energy, where your digestive system breaks down the food you eat and changes it into energy stored in your body.





Check your understanding

▸ **Complete the following table :**

Example	Energy changes	
	From	Into
1. Electric fan :	....	....
2. Door bell :	....	....
3. Radio :	....	....
4. Electric lamp :	....	....

Optional Digital Activity

Activity 9 **"Forms of Energy"**, in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

Optional Digital Activity

Activity 10 **"Energy Transformation in Engines"**, in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

In the Assessment Book :
Try to answer :
Self-Assessment (30)

Exercises on Lesson 3

● Understand ● Apply ● Analyze ● Evaluate ● Creat...

1 Choose the correct answer :

- 1. A ball at the top of a hill stores .... energy.
  a. sound b. light c. chemical d. potential
- 2. The stored energy in a battery of a flashlight changes into .... , when it is turned on.
  a. chemical energy b. sound energy
  c. light energy d. potential energy
- 3. All the following examples store chemical energy, except ....
  a. food. b. natural gas. c. a battery. d. a compressed sprin...
- 4. Energy can do all the following, except ....
  a. It can be stored in an object.
  b. It can be transferred from an object to another one.
  c. It can be transformed from one form into another one.
  d. It can be destroyed and cannot be created.
- 5. If an object stops at a certain height from the Earth's surface for two hours th... falls down, this means that ....
  a. its potential energy will be destroyed before two hours.
  b. its kinetic energy will be destroyed after two hours.
  c. its stored potential energy will change into kinetic energy.
  d. its stored kinetic energy will change into potential energy.
- 6. All the following examples have stored potential energy, except ....
  a. a stopped roller coaster at the top of a hill.
  b. a moving car on a flat road.
  c. a battery of a car.
  d. a compressed spring of a toy.
- 7. All the following examples represent kinetic energy, except ....
  a. light waves moving through the air.
  b. sound waves moving through the air.
  c. stored chemical energy in a car battery.
  d. water particles movement during heating.
- 8. The potential energy of an object depends on .... (Cairo 2...
  a. its mass only.
  b. its height from the Earth's surface only.
  c. its mass and its height from the Earth's surface.
  d. its temperature.

9. All types of energy can be classified into two main groups which are ....
a. light energy and sound energy.
b. chemical energy and electrical energy.
c. potential energy and kinetic energy.
d. magnetic energy and thermal energy.

(Cairo 2022)

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Sound energy	a. changes into another energy that can be stored inside the human body.
2. Light energy	b. when it reaches our ears, it causes hearing.
3. Thermal energy	c. changes into electrical energy in a flashlight.
4. Stored chemical energy in food	d. is produced from electric heater.
5. Stored chemical energy in a battery	e. when it reaches the nose, it causes smelling.
	f. when it reaches our eyes, it causes vision.

1. .... 2. .... 3. .... 4. .... 5. ....

3 Put (✓) or (✗) :

1. New energy cannot be created, but existing energy can be destroyed. ( )
2. A compressed spring stores potential energy. ( )
3. Objects that have the same masses and placed at the same height, have the same potential energy. ( )
4. Kinetic energy cannot be transformed into potential energy. ( )
5. Light waves is a form of potential energy. ( )
6. We can see the movement of electricity through a wire. ( )
7. You can change kinetic energy into stored potential energy when you compress a toy spring. ( )
8. As the height of an object from the Earth's surface increases, its potential energy increases. ( )

4 Write the scientific term of each of the following :

1. It is the stored potential energy in a car battery. (.....................)
2. It is a form of kinetic energy that can move through the air and we can see it. (.....................)

3. It is a form of kinetic energy due to vibrations of particles in a substance as it heats up. (..................)
4. It is a form of potential energy that pulls objects towards the Earth's surface. (..................)

5 Correct the underlined words :

1. When an object falls from a certain height, its stored potential energy changes into chemical energy. (..................)
2. The energy that is resulted due to the vibration of particles in a substance as it heats up, known as sound energy. (..................)
3. As the height of an object from the Earth's surface, decreases its potential energy increases. (..................)
4. Thermal, chemical, electrical and light energies are forms of kinetic energy. (..................)
5. A car battery stores a form of kinetic energy known as chemical energy. (..................)
6. A fan turns the chemical energy stored in natural gas into thermal energy. *(Alexandria 2022)* (..................)

6 Complete the following sentences :

1. Among the forms of potential energy .... and .... energies, while .... energy is a form of kinetic energy.
2. The energy which is stored in a ball at the top of a hill is .... potential energy. *(Kafr El-Sheikh 2022)*
3. Thermal energy is considered as one of the forms of .... energy.
4. Some forms of kinetic energy travel in air in the form of waves such as .... and .... energies.
5. Electrical energy is changed in loudspeakers into .... energy, while it is changed in the electric fan into .... energy.
6. In the electric bell, ... energy changes into .... energy.
7. The chemical energy in the battery of a flashlight can be changed into .... and .... energies.
8. In gas oven, ... energy changes into .... energy.
9. When a ball is on a table, it stores .... energy, while as it falls down to the ground, this energy changes into .... energy.

10. When you clap your hands, the kinetic energy changes into .... energy, while when you rub your hands together, kinetic energy changes into .... energy.
11. Fireworks produce sound and .... energies which are considered as forms of .... energy.
12. Television needs .... energy to be operated and changes it into .... and .... energies which are forms of kinetic energy.

7 Give reasons for :

1. Electric lamp produces different forms of energy.

....

2. On filling the spring of a toy car, then let it free, the car moves.

....

8 What happens if ... ?

1. You operate a washing machine. (according to the change of energy).

....

2. A boy moves down the slide. (according to the change of energy).

....

3. You switch on an electric lamp. (according to the change of energy).

....

9 Cross out the odd word :

1. Sound energy – Light energy – Thermal energy – Chemical energy. (....................)
2. Sound energy – Light energy – Electrical energy – Thermal energy. (....................)

10 Look at the opposite figure, then choose the correct answer :

Mazen

Amir

1. Mazen has a big amount of ....
   a. potential energy.
   b. kinetic energy.
   c. both potential and kinetic energies.
   d. both potential and light energies.
2. Which of the following sentences is correct ? ....
   a. Amir has kinetic energy more than that of Mazen.
   b. Amir has potential energy more than that of Mazen.
   c. Amir has kinetic energy equal to that of Mazen.
   d. Amir has potential energy equal to that of Mazen.
3. The potential energy of the ball is ....Amir.
   a. more than that of
   b. equal to the kinetic energy of
   c. equal to that of
   d. less than that of

LESSON 4

Activity 11 Easy Life Tool

- You have learned a lot about different forms of energy and how they can transform from one form into another.
- **Now**, you can use this knowledge to design a tool that helps us to do work.

Example :

- **My tool :** A robot hand
- **Its function :** Opening the jar cap that it is hard to be opened.
- **The source of energy :** The robot gets power from batteries when it is turned on.



The changes of forms of energy inside the robot

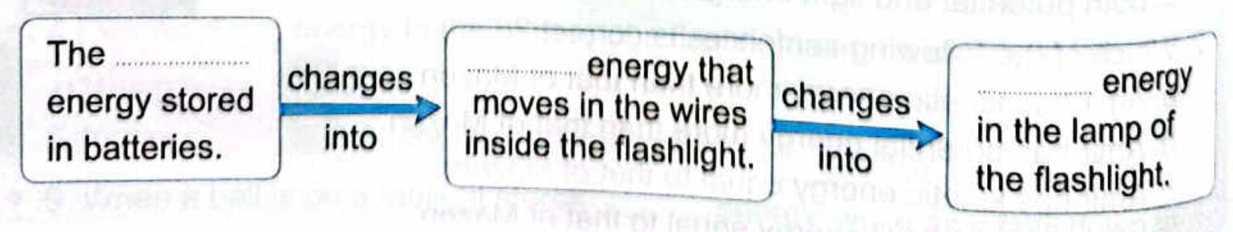
The chemical energy stored in the batteries. → changes into → Electrical energy in the robot hand. → changes into → Mechanical kinetic energy when the robot hand moves to open the jar.

▸ **From the previous explanation, we can conclude that :**

- Energy is not created or destroyed when transferred from the battery to the robot hand.
- Energy is converted from one form (chemical energy) to another form of energy (mechanical energy) when the robot hand opens the jar.



▸ **Complete the following diagram that shows the changes of energy when you switch on a flashlight :**



In the Assessment Book :
Try to Answer : Self-Assessment 31

easy life tool	أداة لحياة أسهل	jar cap	غطاء إناء	convert	يحول
design	يصمم	robot	إنسان آلي		

Exercises on Lesson 4

● Understand ● Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

1. Chemical energy can be stored in .... *(Giza 2022)*
   a. food only. b. battery only.
   c. television and food. d. food and battery.
2. Humans cannot live without .... to obtain the needed energy for doing their activities.
   a. reading books b. driving cars
   c. watching television d. eating food

2 Choose from column (B) what suits it in column (A) : *(Cairo 2022)*

(A)	(B)
1. Food	a. It can be transformed into potential energy.
2. Kinetic energy	b. It is the source of energy for humans.
3. Potential energy	c. It is the stored energy in an object.
	d. It cannot transferred into another form of energy.

1. .... 2. .... 3. ....

3 Put (✓) or (✗) :

1. Orange, potato and battery contain stored chemical energy. (   )
2. A car does work when it moves from one place to another. (   )
3. Burning of food inside our bodies produces energy that allow us to do our activities. (   )

4 Write the scientific term of each of the following :

1. The type of fuel that is used inside the car to obtain kinetic energy. (....................)
2. The energy that is stored in both food and batteries. (....................)

5 What happens if ... ?

1. Food burns inside the human body.

....

2. You put a battery inside a flashlight, then switch it on. (according to the change of energ

....

....

6 **Write each of the following words in front of the suitable sentence below :**

(Flashlight – Gas oven – Food)

1. Its burning changes the chemical energy into kinetic energy inside our bodies. (.................
2. It changes chemical energy into thermal energy to be used in cooking. (.................
3. It changes chemical energy into light and thermal energies. (.................

7 **Complete the following sentences below pictures :**



1. Batteries inside the radio store .... potential energy.
2. .... energy in the wires inside the radio.
3. .... energ produced from the radio speaker.

LESSON 5

Activity 12

Record Evidence like A Scientist

In this concept, you have learned about energy, motion, forms of potential energy and kinetic energy, and energy transformation in engines.

Now, try to think like a scientist by writing your claim, your evidence and your scientific explanation about one of the main points of this concept through the four steps you have learnt in the previous concepts.

Step 1 The Question

How do moving objects get energy and what are the changes of energy that take place inside them?

Step 2 My Claim

....

....

Step 3 My Evidence

....

....

....

Step 4 My Scientific Explanation

....

....

....

....

Optional Digital Activity

Activity 13 **"Kinetic Energy and Potential Energy in Winter Sports"** in the school book is an optional digital activity. You can do this activity by scanning its QR code in your school book.

Activity 14 Review : Energy and Motion

▸ **We can summarize this concept in the following main points :**

- Energy is very important in our life and it is found everywhere around us.
- All moving objects have kinetic energy.
- The roller coaster has the most potential energy when it reaches the highest point of the hill. This energy changes into kinetic energy when the roller coaster races down the hill.
- The kinetic energy increases as the speed increases.

Forms of energy :

- Mechanical energy.
- Chemical energy.
- Thermal energy.
- Light energy.
- Electrical energy.
- Sound energy.

Energy :

It is the ability to do work or to cause change .

Work :

It is a force that causes an object to move a distance.

Potential energy :

It is the amount of energy that is stored in an object due to its position.

Kinetic energy :

It is the energy of an object due to its motion.

- Energy can be stored and changed from one form to another.
- Potential energy changes into kinetic energy and vice versa.

Forms of potential energy :

- Gravitational potential energy.
- Chemical potential energy.

Forms of kinetic energy :

- Sound energy.
- Light energy.
- Electrical energy.
- Thermal energy.

Potential energy of any object depends on :

1. How heavy the object is (the mass of object).
2. How high the object is above the Earth's surface (the height of the object from the Earth's surface).

Some changes of potential energy into kinetic energy :

Example	Energy changes	
	From	Into
• Flashlight.	Chemical energy.	Light energy and thermal energy.
• Gas oven.	Chemical energy.	Thermal energy.
• Normal car.	Chemical energy.	Kinetic energy, sound energy and thermal energy.
• Spring-powered car.	Potential energy.	Kinetic energy.

The chemical energy stored in food changes into kinetic energy that helps us to do activities.

Energy cannot be created or destroyed, but it changes from one form into another.

In the Assessment Book :

Try to answer :
- Self-Assessment (32)
- Model Exam on Concepts (2.1) & (2.2)

Model Exam on Concept (2.2)

Total marks 20

1 (A) Choose the correct answer :

(5 marks)

1. When an object moves down a ramp, its stored potential energy ....
   a. increases.
   b. doesn't change.
   c. changes to a less active form of energy.
   d. changes to a more active form of energy.
2. The form of energy that can be seen is ....
   a. thermal energy. b. electrical energy.
   c. light energy. d. sound energy.
3. All the following examples store chemical energy, except ....
   a. food. b. gasoline.
   c. a battery. d. a compressed spring.
4. When you jump high in the air, the forces affecting you must be ....
   a. balanced. b. unbalanced.
   c. created. d. destroyed.

(B) Give a reason for the following :

Both the Sun and electric lamp produce two forms of energy.

....

2 (A) Put (✓) or (✗) :

(5 marks)

1. The objects that don't move have no energy. (
2. To do work, you must push or pull an object through a certain distance. (
3. Light waves is a form of potential energy. (
4. Orange, potato and car battery contain stored chemical energy. (

(B) Complete the following sentences below pictures :

changes into → changes into

1. Batteries inside the radio store .... potential energy.
2. .... energy in the wires inside the radio.
3. .... energy produced from the radio speake

3 (A) Correct the underlined words : *(5 marks)*

1. When an object falls down, it has more active form of energy known as potential energy. (..........................)
2. Sound energy produced from the gas oven is used in cooking food. (..........................)
3. A battery stores a form of kinetic energy known as chemical energy. (..........................)
4. Gasoline contains electric potential energy. (..........................)

(B) What happens if ... ?

If a stopped ball at the top of a slope starts to move down.
(according to the change of its energy)

....

....

---

4 (A) Write the scientific term of each of the following : *(5 marks)*

1. The form of energy that the object has due to its movement. (..........................)
2. The energy that is used to operate all electric devices. (..........................)
3. The form of energy that is stored inside an object placed at a high place from the ground. (..........................)
4. The energy that is stored in both food and batteries. (..........................)

(B) Cross out the odd word :

Sound energy – Light energy – Thermal energy – Chemical energy. (..........................)


Concept
2.3
Energy and
Collisions



Learning outcomes

By the end of this concept, your child will be able to :

- Analyze and interpret data to describe how the speed and mass of objects relate to changes observed in a collision.
- Calculate the speed of objects using standard units of measurement.
- Construct an explanation based on evidence and logical reasoning to describe energy transfer in a collision.
- Apply mathematical thinking to organize data to represent patterns related to mass, speed and the energy of objects.

Key vocabulary

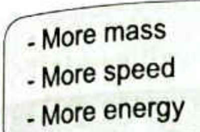
- Collision
- Mass
- Speed

Notes For Parents On Concept [2.3]

Lessons	Activities	What you should do with your child
1	Activity 1	Discuss with your child that faster and heavier objects have more energy than slower and lighter ones.
	Activity 2	Help your child to know that kinetic energy can transfer from one object to another.
	Activity 3	Help your child to find out some online sources to learn more about the importance of seatbelts and airbags during accidents.
2	Activity 4	Discuss with your child the meaning of collision and let him/her mention some examples of collision between objects.
	Activity 5	Help your child to know the relation between speed, distance and time.
	Activity 6	Discuss with your child the effect of speed on collision between objects.
	Activity 7	Discuss with your child the relation between the speed and kinetic energy of an object that moves on a ramp and the angle of inclination.
3	Activity 8	Let your child to do a simple experiment to find out the relation between force, speed and kinetic energy of a moving object.
	Activity 9	Discuss with your child the effect of mass on collision between objects.
4	Activity 10	Let your child do a simple experiment to find out that the mass of a moving object affects its speed and its kinetic energy.
5	Activity 11	Discuss with your child how kinetic energy transfers between objects.
	Activity 12	Help your child to think like a scientist by answering a question about one of the main points of this concept then write his/her claim, evidence and the scientific explanation.
6	Activity 13	Optional digital activity.
	Activity 14	Let your child review the main points in this concept.









What happens to objects when they collide with each other ?

- In the example above, the truck which is the heavier object has more energy than the car which is the lighter object.
- If the truck is the faster object it has more energy than the car which is the slower object.

Therefore, during collision, the object that has more energy (the truck) causes more damage than that has less energy (the car).

ample of collision :

A wrecking ball :

It is a very heavy steel ball that swings on a cable.

It is used to collide with walls of a building to help construction workers knock down walls or parts of buildings.



Wrecking ball

this concept, we will study :

- Collision of objects.
- Basics of speed.
- Energy and collision.
- The effect of speed and mass on collision.
- Energy conversions during a collision.

ier	أثقل	truck	شاحنة	construction	البناء
r	أخف	wrecking ball	كرة الهدم	knock down	يهدم
ion	اصطدام	steel	فولاذ	basics	مبادئ



Activity 2 Collision

▶ **Look at this picture, then complete the sentences by using these words :**

(different – kinetic – increases).



1. The bat transfers its .... energy to the ball.
2. The speed of the ball .... when the bat hits it.
3. When the bat hits the ball, the ball will move in
   a .... direction.



Collision in cricket :



- A cricket is a popular game all over the world.
- In cricket, a player uses a wooden bat to hit a ball.
- The cricket player holds a bat and moves it as the ball comes towards him at high speed to collide with the bat.

▶ **What happens to the energy of the moving bat when it hits the moving ball ?**

- The bat transfers its kinetic energy to the ball.
- Then, the speed of the ball increases and the ball returns back in a different direction.
- This collision produces a popping sound and the player would feel the bat hitting the ball.

Check your understanding

▶ **Put (✓) or (✗) :**

1. During collision between a ball and a bat, the direction of the ball will not change. (   )
2. During collision between a ball and a bat, the kinetic energy transfers from the bat to the ball. (   )

bat	مضرب	popular	شائعة
hits	يضرب	popping sound	صوت فرقعة

Activity 3 Watching Objects Collide

What happens to the driver's body when the car stops suddenly ?

- The driver's body continues to move forward where the objects that are in motion stay in motion until something stops them.
- **But,** What are the safety equipment that keep the driver and passengers in their places ?

Safety equipment used during collision of cars

1 Seatbelts :

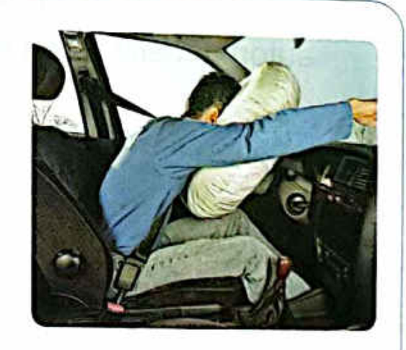
They are used in cars to keep the driver and also the passengers from moving forward when the car stops suddenly, so seatbelts have saved thousands of lives.



2 Airbags :

Their structure :

Airbags are made up of thin nylon material folded into the steering wheel, seats, dashboard or doors.



Idea of operation :

- **During collision**, airbags inflate automatically when sensors in the car detect a crash.
- A sensor tells the airbags to inflate and fill with a gas to provide a soft cushion.
- **After collision**, the airbags deflate almost as fast as they inflate, because they have holes (vents) to allow them to deflate, so the driver can get out of the car.



Their importance :

- Airbags slow the speed of the driver's motion forward.
- Airbags absorb the energy of the car on collision.

Give a reason for ...

Airbags deflat quickly after few seconds of collision.

- Because they contain small holes (vents), through which the gas comes out, so the driver can get out of the car.

afety equipment	وسائل الأمان	steering wheel	عجلة القيادة
eatbelt	حزام الأمان	dashboard	تابلوه
irbags	وسائد هوائية	sensor	حساس

Collisions between trains and cars



- There are many accidents in which a train hits a car that may be stuck on the train tracks.
- Trains are much larger than cars. Also, trains can travel at a high speed.
- It is more dangerous, as the force of the collision between the car and train increases.



Check your understanding

▸ Complete the following sentences :

1. Safety equipment of cars during collision include .... and ....
2. Airbags are made up of .... material.
3. In cars, ... protect passengers during collision where they inflate automatically when sensors in the car detect a crash.

In the Assessment Book:
Try to answer :
Self-Assessment (33)

 accidents حوادث dangerous خطر crash اصطدام

Exercises on Lesson 1

Understand ● Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

1. When objects collide with each other, ... is transferred between them.
   a. time b. distance
   c. energy d. nothing
2. The object that has the most kinetic energy, is .... object.
   a. the fastest and lightest b. the slowest and lightest
   c. the fastest and heaviest d. the slowest and heaviest
3. When the cricket bat hits the ball, the ball direction .... and the ball speed ....
   a. doesn't change – doesn't change.
   b. doesn't change – changes.
   c. changes – doesn't change.
   d. changes – changes.
4. Collisions usually produce ....
   a. solar energy. b. sound energy.
   c. gravitational potential energy. d. chemical potential energy.
5. If there is nothing to stop a moving object, this object will ....
   a. stay in motion. b. stop after few hours.
   c. stop after few minutes. d. stop after few seconds.
6. Seatbelts work when the car ....
   a. decreases its speed gradually. b. increases its speed gradually.
   c. suddenly stops. d. stops gradually.
7. When a car stops suddenly, the passengers move ....
   a. backward. b. forward.
   c. upward. d. downward.
8. Airbags in the car are folded into all the following places, except ....
   a. steering wheel. b. dashboard.
   c. doors. d. tires.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Wrecking ball 2. Cricket bat 3. Seatbelt 4. Airbag	a. it is one of the safety equipment in cars that is inflated with a gas during crashes. b. it changes its sound energy into light energy. c. it is used to hit a ball during playing. d. it is one of the safety equipment in cars that keeps passengers in their places during crashes. e. it is used to hit a wall during destruction of a building.

1. .... 2. .... 3. .... 4. ....

3 Put (✓) or (✗) :

- 1. When a cricket bat hits the ball, its potential energy transfers to the ball. ( )
- 2. Seatbelt is one of the safety equipment in cars. ( )
- 3. During a crash between two cars, the potential energy transfers from the faster car to the slower one. ( )
- 4. After car collision, the airbags deflate as fast as they inflate. ( )
- 5. When a fast car hits a very big tree, the kinetic energy of the car transfers into the tree. ( )

4 Write the scientific term of each of the following :

- 1. A heavy steel ball that swings on a cable and is used in destruction of parts of buildings. (..................)
- 2. Safety equipment used to prevent car passengers from moving forward when the car stops suddenly. (..................)
- 3. Safety equipment used to provide soft cushion when it is inflated automatically with a gas during collision of cars. (..................)
- 4. They are present in car airbags and allow them to deflate fast after collision. (..................)

5 Correct the underlined words :

- 1. A fast and heavy object has more <u>potential</u> energy than a slow and light object. (..................)
- 2. <u>Football</u> is used to collide with buildings to knock down their walls. (..................)

3. When a train at a high speed hits a car, the train gets more damage. (..................)
4. As a result of hitting the ball with the wooden bat, the speed of the ball doesn't change. (..................)
5. Seatbelts absorb the energy of the car due to its collision and gets inflated. (..................)
6. Airbags are made up of thick wooden material. (..................)
7. The cricket bat transfers its light energy to the ball. (..................)

6 Complete the following sentences :

- 1. When a bat hits a ball strongly, the .... energy of the bat is transferred to the ball and the speed of the ball ....
- 2. Among safety equipment which are used during collision of cars .... and ....
- 3. As a result of collision between the ball and the bat, the direction of the ball will ....
- 4. During a car crash, the .... is inflated with a gas to provide a soft cushion.
- 5. Airbags absorb the .... of the car during collision.
- 6. When objects collide with each other, ... is transferred between them.
- 7. In cars, the .... prevents passenger from moving forward when the car suddenly stops.

7 Give reasons for :

- 1. The speed of the ball increases when the bat hits it hard.

  ....

- 2. Seatbelts in cars are very important.

  ....

- 3. Airbags in cars are very important.

  ....

  ....

8 What happens if ... ?

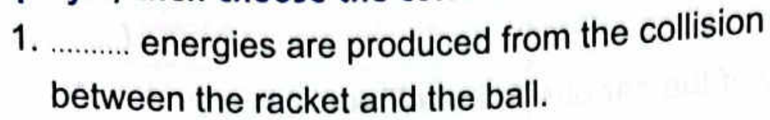
1. The moving cricket bat hits a ball (according to the transfer of energy).

   ....

2. Airbags in a car don't inflate during a crash.

   ....

9 **Look at the opposite photo that shows a tennis player, then choose the correct answer :**



1. .... energies are produced from the collision between the racket and the ball.
   a. Electrical and kinetic
   b. Kinetic and light
   c. Electrical and sound
   d. Kinetic and sound
2. When the racket hits the ball, the .... of the ball is changed.
   a. size b. mass c. direction d. color
3. During hiting the ball with the racket, all the following sentences are correct <u>except</u> ....
   a. the ball changes its direction.
   b. kinetic energy transfers from the racket to the ball.
   c. the speed of the ball changes.
   d. the size of the ball decreases.

---

10 **Look at the opposite photo that shows a crash between a train and a car, then answer the questions below :**



1. In your opinion, which one of them is damaged more than the other ? (Give a reason for your answer).

   ....

   ....
2. What happens to the car airbags during the crash ?

   ....

   ....

LESSON 2

Activity 4 Energy and Collisions

Look at this picture, then put (✓) or (x) :



1. During collision between two objects, there is no change of energy occur. (   )
2. The motorcycle has a potential energy as it is running on the street. (   )
3. The kinetic energy of the motorcycle transfers to the ice cream cart during collision. (   )

ergy and collisions :

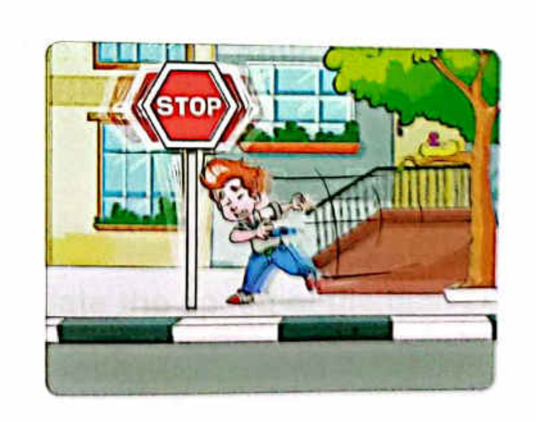
- When two objects bump or crash with each other, we can say a collision happens between them.

Collision:

It is the moment where two objects hit or make contact in a forceful way.

- When two objects collide with each other, an amount of energy transfers occurs and also changes of energy occur.

xample of collision between two objects :



What happens if you are running down the street without looking in front of you and hit a traffic sign post ?

In this situation :

- You will stop moving forward.
- You may bounce off and get hurt.
- The traffic sign post may vibrate.

otorcycle	دراجة نارية	forceful way	طريقة عنيفة	get hurt	تتعرض للإصابة
rt	عربة	traffic sign post	لوحة إشارات مرورية		

▸ **In the previous example, what are the changes and transfer of energy tha take place ?**

- The kinetic energy transfers from your body to the traffic sign post. This leads to the vibration of the traffic sign post.
- A part of your kinetic energy changes into a sound energy (the sound you hear o collision).



Check your understanding

▸ **Look at the following picture, then complete the sentences using these words :**

bread – kinetic – collides – cart



1. The bicycle has .... energy as it is running on the street.
2. When the cyclist .... with the bread cart, the kinetic energy of the bicycle transfers to the .... and the .... , that causes the cart tips over and the bread scatters.

tips over

تقع scatters

Activity 5 Basics of Speed

...sics of speed

...peed is a measurement of how fast something is moving.

...peed :

...s the distance traveled in a certain amount of time.

...lculating the speed :

To calculate the speed of any moving object, we can divide the distance that the object moves by the time taken to travel that distance as follows :

$$\text{Speed} = \frac{\text{Distance (in Kilometer or meter)}}{\text{Time (in hour or second)}}$$

So, we can define speed also as, distance per unit time.

The measuring unit of speed may be :

Kilometer Per Hour (km/hr) Meter Per Second (m/sec.)

• The speed of an object is not affected by the direction of this moving object.

Example :

If a car moves forward 5 meters in one second, then it moves backward 5 meters in one second, so its speed is still 5 meters per second.

Problems :

1. Amir runs 100 meters in 20 seconds. Calculate the speed of Amir.

$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$

$\text{Speed} = \frac{100}{20} = 5$ m/sec.

Distance = 100 m.
Time = 20 sec.

2. If a bus traveled 600 kilometers in 5 hours. Calculate the speed of the bus.

$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$

$\text{Speed} = \frac{600}{5} = 120$ km/hr.

Distance = 600 km.
Time = 5 hours

Traffic jam	الازدحام المروري	measurement	قياس	distance per unit time	المسافة لوحدة الزمن
highway	الطريق السريع	certain	معين		

Comparing the speed of two moving objects :

▶ To compare the speed of two moving objects, we can use one of the following two ways :

1. Measure the distance that both objects travel in the same amount of time.

- The object that travels a greater distance in the same amount of time is moving at a greater speed.
- **Example :**

If two runners run for 1 hour, where :
- The first runner travels 6 kilometers.
- The second runner travels 9 kilometers.

So, the second runner is moving at a greater speed, because he travels a greater distance (9 km) in the same amount of time (1 hour).



2. Measure the time that both objects take to travel the same distance.

- The object that travels the same distance in a smaller amount of time is moving at a greater speed.
- **Example :**

If two cars are racing 120 kilometers, where :
- The first car reach the end line of race in 1 hour.
- The second car reach the end line of race in 2 hours.

So, the first car is moving at a greater speed, because it travels the same distance (120 kilometers) in a shorter time (1 hour).





Check your understanding

▶ **Complete the following sentences :**

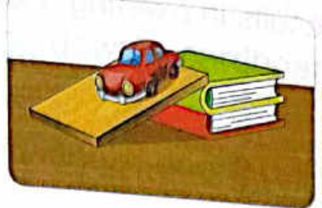
1. A car that travels 90 kilometers per hour is .... than a car that travels 60 kilometers per hour.
2. Two bicycles are racing for 500 meters, the bicycle that finishes the race in a greater time is .... than the bicycle that finishes in a shorter time.
3. The distance per unit time is known as ....

compare يقارن | end point نقطة النهاية | racing سباق



Activity 6 The Effect of Speed on Collisions

From the previous concept, you have learned that as the incline of the ramp increases, the speed of the object increases.





- The amount of kinetic energy of an object depends on :
  - The mass of object.
  - The speed of object.
- Now, we are going to study the effect of speed on collisions.

When a fast object hits another object, the fast object transfers some of its energy to the other object, where :

- By increasing the speed of the object, the energy that transfers during collision will increase.
- Some of this transferred energy may be in the form of heat, light or sound.



Comparison between a fast-moving object and a slow-moving object :

Fast-moving object	Slow-moving object
• It has more energy.	• It has less energy.
• When this object hits another object, it exerts more force.	• When this object hits another object, it exerts less force.
• This force causes a big damage to the object that cannot be repaired.	• This force causes less damage to this object than the fast-moving object.

inclined مائل damage تلف repair إصلاح

Note

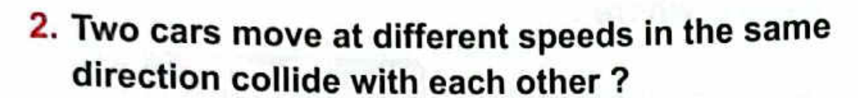
Driving fast is very dangerous, because if a car increases its speed, its kinetic energy increases that results in exerting a large force during an accident.

What happens if ... ?



1. **Two cars move at different speeds in opposite directions collide with each other ?**

   The forces exerted in the accident depend on the speed of both cars, so damage would be much more severe because they move in opposite direction.





2. **Two cars move at different speeds in the same direction collide with each other ?**

   The forces exerted in the accident depend on the speed of both cars, this leads to damage that would be less severe because they move in the same direction.



Check your understanding

▶ **Complete the following sentences :**

1. The amount of kinetic energy of an object depends on both .... and .... of this object.
2. Fast-moving objects have .... kinetic energy, while slow-moving objects have .... kinetic energy.
3. By increasing the speed of an object, its kinetic energy ....

 exert بذل severe

Activity 7 Racing Downhill

...u have learned about speed and energy, in this activity you will measure the ...eed and the kinetic energy of an object moving down a cardboard tube at various ...line angles.

...w, let's study the relation between speed and kinetic energy.

...ools



Toy truck



Metric ruler



Cardboard paper towel tube



Paper cup



Stopwatch



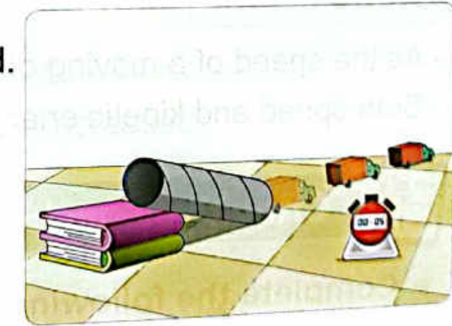
Scissors



Books

...teps

Part (1) : The relation between the speed and the angle of inclination.



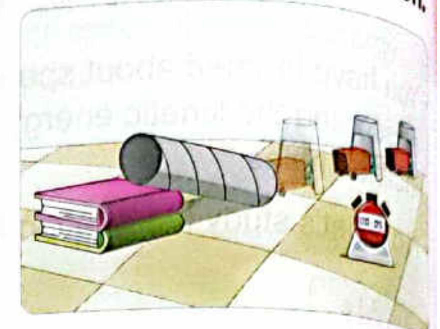
1. Put one end of the tube on the top of two books, and the other end of the tube resting on the ground.
2. Record in a table the number of books used to set up the tube in the column "Number of books".
3. Roll the truck down the tube. Use the stopwatch to determine the time and record in the table how long the truck takes to travel to the end of the tube in the column "Time to travel".
4. Add one book to change the incline angle and repeat the steps, then add another book and repeat the steps again.

Note

As the "Time of travel" is less, the speed of the toy truck is higher.

...rdboard tube	أنبوبة من الورق المقوى	angle of inclination	زاوية الميل	column	عمود
...cline angle	زاوية الانحدار	resting	مستقرة	metric ruler	مسطرة مترية
...wel	منشفة / فوطة	determine	تحديد		

Part (2) : The relation between the kinetic energy and the angle of inclination.



5. Now, repeat the activity as in part (1), but place the paper cup at the bottom of the tube as shown in the figure.
6. Measure the distance the cup moves each time after the truck rolls into it, and record in the table the distance that the cup travels in the column "Distance the cup traveled"

Note

As the "Distance the cup traveled" is longer, the kinetic energy of the toy truck is greater.

Number of books	Part (1)	Part (2)
	Time to travel	Distance the cup traveled
2 books	5 seconds	3 cm
3 books	3 seconds	4 cm
4 books	2 seconds	7 cm

Observations

- As the angle of inclination increases, the speed of the truck increases as it takes less time to reach the end of the tube.
- As the angle of inclination increases the distance that the paper cup traveled increases.

Conclusions

- As the speed of a moving object increases, its kinetic energy increases.
- Both speed and kinetic energy increase, as the angle of inclination increases.



Check your understanding

▸ **Complete the following sentences using the words below :**

(increases - faster - kinetic)

1. If the incline of a ramp increases, the object rolling down it will be ....
2. When the speed of an object increases, its kinetic energy ....
3. We can use the speed of an object to know the .... energy of this object.

In the Assessment Book :
Try to answer :
Self-Assessment (34)

 bottom الأسفل paper cup كوب ورقي

Exercises on Lesson 2

Understand ● Apply ● Analyze ● Evaluate ● Create

Choose the correct answer :

1. When two objects of the same mass move with the same speed collide with each other, the resulted damage ....
   a. is larger in one of them and smaller in the other.
   b. is equal in both of the two objects.
   c. doesn't depend on the mass of the two objects.
   d. doesn't depend on the speed of the two objects.
2. On collision energy is ....
   a. created.
   b. destroyed.
   c. created and transferred.
   d. transferred and change.
3. How can we calculate the speed of an object ? .... *(Alexandria 2022)*
   a. Speed = distance ÷ time
   b. Speed = distance x time
   c. Speed = distance + time
   d. Speed = distance – time
4. Which of the following is a measuring unit of speed ? .... *(Cairo 2022)*
   a. hr/km.
   b. sec/m.
   c. kg/sec.
   d. m/sec.
5. What is the speed of a car that travels 400 meters in 4 second ? ....
   a. 100 m/sec.
   b. 20 m/sec.
   c. 30 m/sec.
   d. 40 m/sec.
6. As the angle of a ramp decreases, the speed of a toy car rolling on it .... and its kinetic energy ....
   a. increases – decreases.
   b. increases – increases.
   c. decreases – decreases.
   d. decreases – increases.
7. An object keeps moving with same speed when ....
   a. its kinetic energy decreases.
   b. its potential energy increases.
   c. no another force stops it.
   d. another object collides with it.
8. The two factors affecting the kinetic energy of an object are ....
   a. its speed and the color.
   b. its mass and the color.
   c. its speed and the mass.
   d. its light and the sound energies.
9. The mass of an object ....
   a. doesn't affect its potential energy or its kinetic energy.
   b. affects its potential energy and its kinetic energy.
   c. affects its potential energy only.
   d. affects its kinetic energy only.

2 **Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. A heavy object that doesn't move 2. A light object that doesn't move 3. A fast object with a heavy mass 4. A slow object with a light mass	a. has much kinetic energy. b. has much light energy. c. if it moves with a fast speed, it has much kinetic energy. d. has low kinetic energy. e. if it moves with a low speed, it has low kinetic energy.

1. .... 2. .... 3. .... 4. ....

3 **Put (✓) or (✗) :**

1. Fast-moving objects can be exposed to less damage than slow ones. ( )
2. A slow and light object has much kinetic energy. ( )
3. We cannot create a new form of energy and also we cannot destroy an existing form of energy. ( )
4. You have to drive a car as fast as possible, because at high speeds you can avoid collisions. ( )
5. To increase the speed of a moving object, you can collide it with another object that moves in the opposite direction. ( )
6. When two heavy and fast cars move in opposite directions collide together, they produce very small amount of damage. ( )
7. If two objects cover the same distance in the same time so, they have similar speed. ( )
8. We can measure the covered distance in kilometer unit. ( )
9. If car (A) covered a distance of 100 kilometers in one hour and car (B) covered a distance of 100 kilometers in two hours so, car (B) is faster than car (A). ( )
10. The angle of inclination of a ramp affects the speed of an object moving on it. ( )

4 **Write the scientific term of each of the following :**

1. The process in which two objects or more crash into each other, and including an energy transfer. (..................)
2. The energy that can be heard and usually produced when two objects collide with each other. (..................)
3. The liquid that stores chemical energy and used to move cars. (..................)
4. The distance that an object traveled in a certain amount of time. (..................)

Correct the underlined words :

1. When two cars collide with each other, the potential energy transfers from the faster car to the slower car. (..................)
2. The speed of an object affects its potential energy. (..................)
3. Two objects of the same mass and placed at the same height, have the same kinetic energy. (..................)
4. When the speed of an object increases, its kinetic energy decreases. (..................)

Complete the following sentences :

1. The moment when two objects hit or make contact in a forceful way is called ....
2. When a moving car hits a tree, a part of .... energy of the car changes into a .... energy which you hear it.
3. When the speed of a car increases, its .... energy increases.
4. A car with speed = 60 km/hr., its kinetic energy is .... than that of another car with speed = 40 km/hr, if they have the same mass.
5. When two cars collide with each other, some of energy may change into heat , ... and ....
6. The speed depends on the distance that is measured in kilometers or .... and the time that is measured in .... or ....
7. A car covers 80 meters in 4 seconds, so it moves at a speed equals .... m/sec.
8. If the kinetic energy of a moving body decreases, its speed will ....

Give reasons for :

1. When two objects collide with each other, you can hear a sound.

....

....

2. Driving fast is very dangerous.

....

....

What happens if ... ?

1. The speed of a car increases. (according to its kinetic energy)

....

....

2. Two bicycles move in an opposite direction, collide with each other.

....

....

3. We increase the angle of inclination of a ramp on which a toy car moves. (according to the speed of the toy car)

....

....

9 **Look at the opposite photos then answer the questions below :**

1. Which one of the two animals has greater kinetic energy ? (Give a reason for your answer).

....

....

Speed = 40 km/hr.

Speed = 1 km/hr.

2. If the speed of the rabbit decreases, so its kinetic energy will .... (Complete).

10 **Look at the opposite photo, then choose the correct answer :**

1. The car has .... energy that allows it to move on the road.
   a. light
   b. sound
   c. kinetic
   d. thermal
2. If the driver changes the .... of the car, its kinetic energy will change.
   a. color
   b. speed
   c. lights
   d. temperature
3. All the following actions decrease the dangers that may be caused as a result of the collision except ....
   a. increasing the speed of the car.
   b. using the seatbelt.
   c. adding more airbags to the car.
   d. decreasing kinetic energy of the car.

11 **Find the speed of a runner, if you know that he covers 400 meters in 8 seconds.** *(Giza 202...)*

....

....

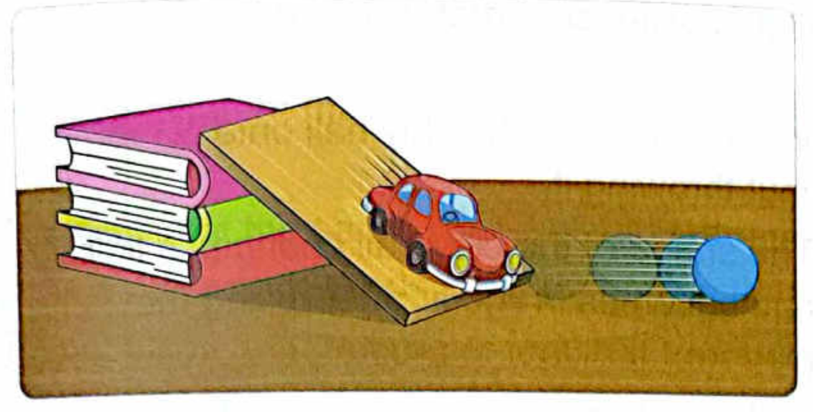
12 **A train travels from Cairo to Alexandria in a distance of 200 kilometers in 2 hours. Find its speed.** *(Minia 202...)*

....

....

Activity 8 Speed and Collisions

ok at this picture which represents a toy car collides with a small ball, en choose the correct answer :



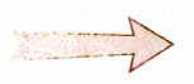
. By increasing the speed of the car, the kinetic energy of this car ....

(decreases – increases – doesn't change)

. The ball moves a distance due to .... of the car.

(force – speed – force and speed)

ou have learned from the previous lessons that :

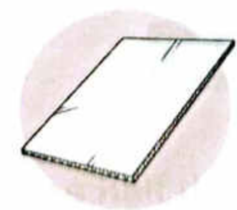
1. By increasing the force of an object  The kinetic energy of this object increases.
2. By increasing the speed of an object  The kinetic energy of this object increases.

ow, we are going to carry out an activity to show the effect of force and speed of moving object on its kinetic energy during collision.

Tools



Modeling clay



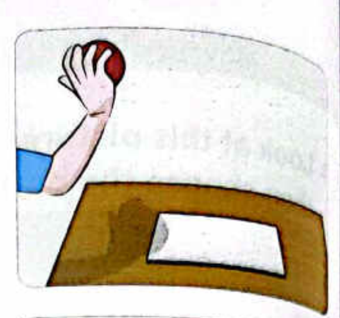
Piece of cardboard



Hard surface (wooden table)

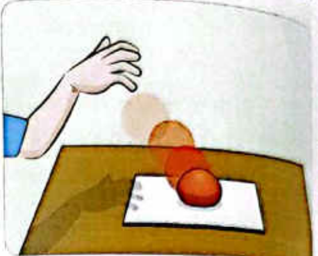
rry out

Steps



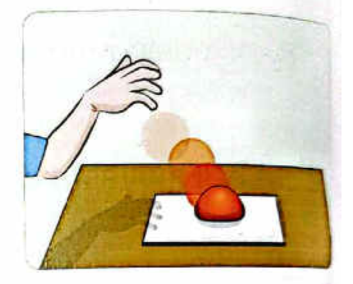
1. Roll a ball of clay in your hands and smoothing its sides.
2. Use the cardboard to make a landing platform, where the clay ball falls on and place this platform on a hard surface like a wooden table.
3. Hold the clay ball at a distance 1 meter above the platform.
4. Lightly open your hands to drop the clay ball onto the platform without throwing it.

   Observation The shape of the clay ball changes a little and becomes irregular after hitting the platform.



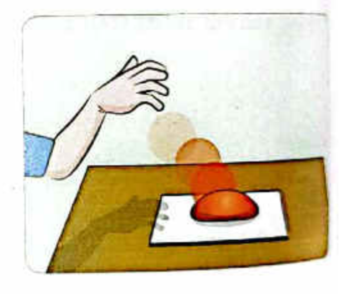
5. Smooth the clay ball over and lift it up to 1 meter above the platform, then repeat the experiment again, but this time throw the clay ball with a gentle force to increase its speed.

   Observation The shape of the clay ball change more and becomes more irregular after throwing it gently.



6. Repeat the experiment one more time and throw the clay ball with a hard force, so its speed increases much more.

   Observation The shape of the ball changes much more and becomes completely irregular after hitting the platform.



Conclusions

- As the force on an object increases, its speed and the amount of its kinetic energy increase.
- As the kinetic energy of a moving object increases, more damage will happen to this object during collision.



Check your understanding

▶ **Put (✓) or (×) :**

By increasing the force on an object, its speed and kinetic energy increases. ( )

 landing platform قاعدة اختبار hard surface سطح صلب gently



Activity 9 The Effect of Mass on Collisions

...ou have learned from the previous lessons the effect of speed on ...ollisions.

...ow, we are going to study the effect of mass on collisions.

...e relation between the mass of objects and their kinetic energy :

- Different vehicles have different masses, where a large truck has a much greater mass than a car.
- If a large truck is traveling at the same speed of a car, the truck has more kinetic energy than the car, so the truck needs a bigger engine than the car.
- As the vehicle moves faster, the amount of fuel that burns inside its engine increases to provide it with more kinetic energy.
- As the mass of an object increases, its kinetic energy increases.

...rom the previous explanation, we can conclude that if the truck and the car ...ove at the same speed, we will find that :



The truck :

- Has a big mass.
- Has a big engine.
- Uses more fuel.
- Has more kinetic energy.



The car :

- Has a small mass.
- Has a small engine.
- Uses less fuel.
- Has less kinetic energy.

Give a reason for ...

The truck whose mass is 1 ton has half the kinetic energy of another truck that has mass 2 ton when they both move at the same speed.

Because if the mass of an object increases, its kinetic energy at the same speed also increases.

...ehicles	سيارات	fuel	وقود	ton	طن
...ruck	شاحنة	engine	محرك		

The effect of mass on collisions :

- A large-mass vehicle causes more damage when it hits something than a small-mass vehicle traveling at the same speed.





What happens if ... ?

1. **A bicycle moving at a speed of 50 km/hr hits a person.**
   The bicycle will cause some injuries to this person, but he will survive.

2. **A car moving at a speed of 50 km/hr hits a person.**
   The life of this person may be endangered.



Check your understanding

▸ Complete the following sentences :

1. A big truck has a .... mass, while small car has a .... mass.
2. If the mass of an object increases, its kinetic energy ....

In the Assessment Book :
Try to answer :
Self-Assessment (35)

 injuries إصابات endanger يعرض للخطر

Exercises on Lesson 3

nderstand ● Apply ● Analyze ● Evaluate ● Create

Choose the correct answer :

1. A very big truck needs .... to move.
   a. very small engine
   b. small engine
   c. very big engine
   d. no engine
2. As the force that acts on an object increases, its ability to do work ....
   a. increases.
   b. decreases.
   c. doesn't changed.
   d. destroyed.
3. When a moving car decreases its speed then stops, so ....
   a. its kinetic energy becomes zero.
   b. its light energy only becomes zero.
   c. its light energy and thermal energy become zero.
   d. its kinetic energy becomes equal to its thermal energy.
4. The amount of fuel that is used in a big truck to produce a certain amount of kinetic energy is .... the amount of fuel in a small car to get the same amount of kinetic energy.
   a. less than
   b. equal to
   c. more than
   d. half to
5. On a flat road, if a large truck is traveling at the same speed of a small car, then the truck has ....
   a. more kinetic energy.
   b. less kinetic energy.
   c. the same kinetic energy of the car.
   d. no kinetic energy at all.
6. If an object moves down along a ramp, as the incline angle of the ramp increases the speed of the object will ....
   a. decrease.
   b. increase.
   c. not change.
   d. become zero.
7. The factor that affecting the kinetic energy of two objects when they move with the same speed is ....
   a. their colors.
   b. their sound energy.
   c. their masses.
   d. their temperatures.
8. When a car stops, all the following become zero, except ....
   a. speed.
   b. kinetic energy.
   c. mass.
   d. work.

● Understand ● Apply ● Analyze ● Evaluate ● Create

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Large-mass vehicle with speed 100 km/hr	a. It has a big amount of kinetic energy.
2. Small-mass vehicle with speed 20 km/hr	b. It has no kinetic energy.
3. Small-mass vehicle that doesn't move	c. It has the most thermal energy.
	d. It has a small amount of kinetic energy.

1. .... 2. .... 3. ....

3 Put (✓) or (x) :

- 1. A small object moving at a low speed has a big amount of kinetic energy. ( )
- 2. The force that acts on an object doesn't affect its speed. ( )
- 3. The smaller the mass of the vehicle, the less fuel it consumes. ( )
- 4. Objects of equal masses and move at different speeds have the same kinetic energy. ( )
- 5. Speed and mass are the factors that affect the kinetic energy of a moving object. ( )

4 Correct the underlined word :

1. A two-ton truck has <u>smaller</u> amount of kinetic energy than that of one-ton truck moving at the same speed. (..............)
2. All moving objects always have <u>light</u> energy. (..............)
3. The larger the mass of a car, the <u>less</u> fuel it consumes. (..............)
4. <u>Potential</u> energy depends on the speed of an object. (..............)

5 Complete the following sentences :

1. By increasing the force that acts on a moving object, its .... increases that causes the increase of its .... energy.
2. If the mass of a moving object decreases, its kinetic energy will .... at the same speed.
3. Traveling at the same speed, a large mass vehicle causes .... damage than a small mass vehicle during collision.

4. A moving train at speed 80 km/hr. causes .... damage than a moving car at speed 80 km/hr. during collision, as the train has more .... and .... energy than the car.

5. The .... energy depends on the speed of a moving object.

6. A car moving with speed 50 km/hr. has .... kinetic energy than that of a truck moving with the same speed.

7. In vehicles, the .... energy that is stored in the fuel changes into .... energy that allows them to move.

Give reasons for :

1. A truck needs a bigger engine than that of a small car to move with the same speed.

....

....

2. A car consumes less fuel than that consumed in a bus to move at the same speed.

....

....

3. A moving truck has kinetic energy more than that of a small moving car at the same speed.

....

....

What happens if ... ?

1. The pushing force that acts on an object decreases. (according to its kinetic energy).

....

2. The speed of a moving object increases. (according to its kinetic energy).

....

3. The kinetic energy of a moving car increases.

(according to the damage during collision).

....

4. A truck and a small car move at the same speed. (according to kinetic energy).

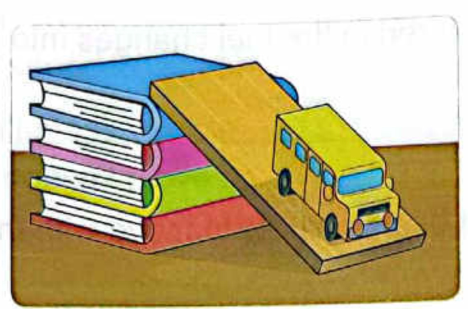
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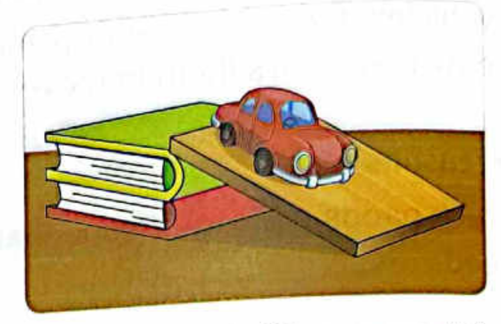
LESSON 4

Activity 10 Mass in Collisions

▶ **Look at these pictures, then complete the following sentences using these words :**

speed - increases - greater - kinetic





1. By increasing the angle of inclination of the ramp, the speed of the car on this ramp ....
2. By increasing the mass of the moving object, its .... energy increases.
3. The mass of the toy bus is .... than the mass of the toy car.
4. As the mass of an object moves down a ramp increases, its .... increases.

▶ **In this lesson, we will study :**

1. How does mass affect speed ?
2. How does mass affect kinetic energy ?

1 How does mass affect speed ?

We will carry out an experiment to show the relation between mass of objects and their speed.



Tools



• 3 toy cars



• Balance (scale)



• 2 books



• Cardboard sheet



• Masking tape



• Stopwatch

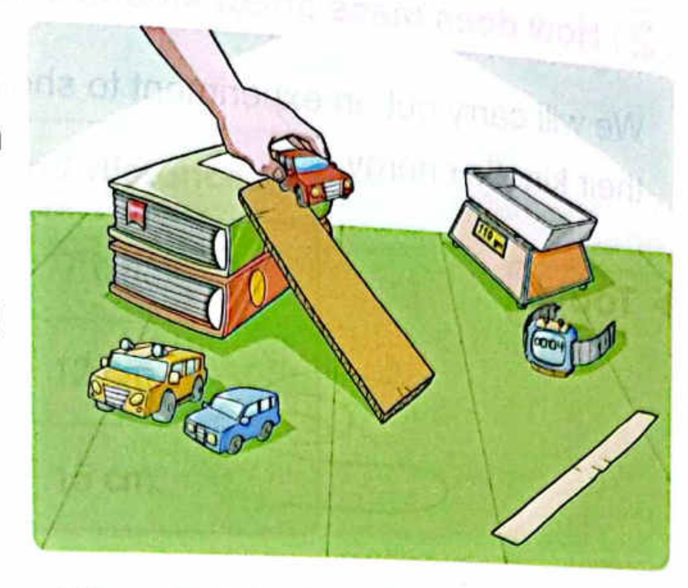


• Meterstick

ramp منحدر
balance ميزان
masking tape
meterstick

Steps

1. Use the cardboard to make a ramp.
2. Place one end of the cardboard ramp on the top of two books over each other, while the other end resting on the floor.
3. Mark a finish line with a piece of masking tape where the distance between the tape and the end of the ramp is 1 meter.
4. Weigh the red car by using the balance and record its mass in the table below.



5. Release the car from the top of the ramp, while your friend hold a stopwatch to measure the time taken to cross the finish line, then calculate the speed of this car.
6. Repeat the previous steps using the blue car, then the yellow one and record their masses and the time taken by each of them to cover the same distance in the table below, then calculate the speed of each of them.

Observations

The results of the three toy cars are :

Cars	Mass	Distance	Time	Speed = $\frac{\text{Distance}}{\text{Time}}$
Red car	110 gm.	1 m	4 sec.	$\frac{1}{4}$ m/sec.
Blue car	160 gm.	1 m	3 sec.	$\frac{1}{3}$ m/sec.
Yellow car	210 gm.	1 m	2 sec.	$\frac{1}{2}$ m/sec.

According to the table above, we can observe that :

By increasing the mass of the car, the time taken to cross the finish line decreases because the speed of the moving car on a ramp increases.

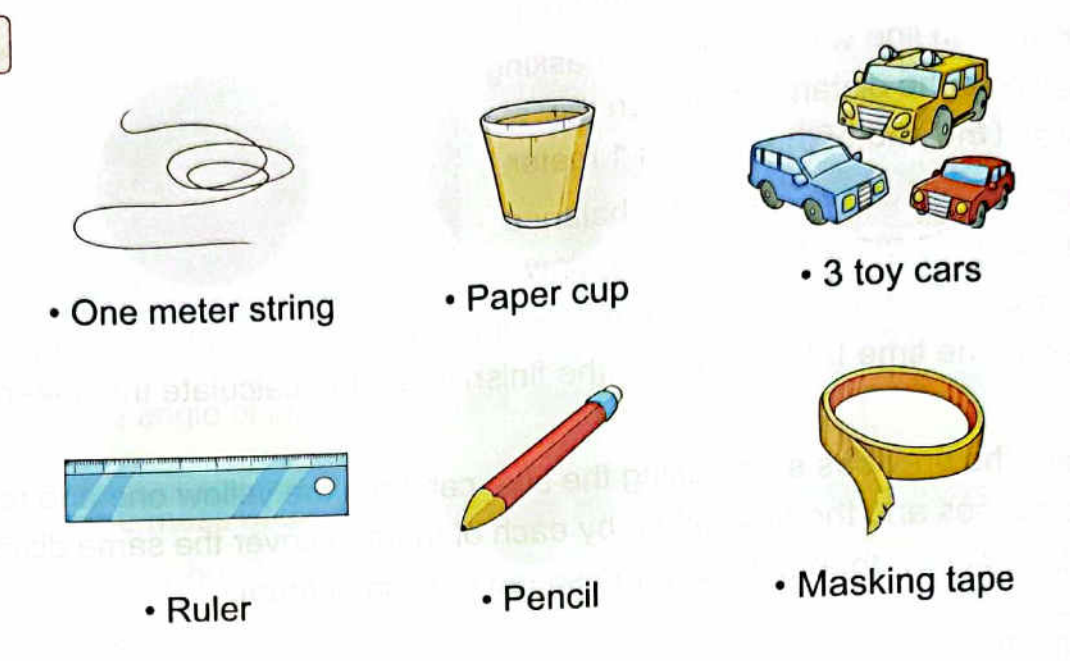
Conclusion

The speed of the moving object on a ramp increases by increasing its mass.

2 How does mass affect kinetic energy ?

We will carry out an experiment to show the relation between mass of objects and their kinetic energy.

Tools



Steps

1. Tie one end of the string to a pencil and the other end to the red toy car.
2. Place the paper cup on the floor, and mark the cup's starting location on the floor with a piece of masking tape.
3. Hold the car straight out, so the cup is in the swinging path of the car when you let it go.
4. Release the toy car to collide with the paper cup.
5. Mark where the cup moved to using a piece of masking tape and then use the ruler to measure how far this is from the starting position.
6. Repeat the previous steps using the blue car, then the yellow one and record the results in another table.

 tie اربط swinging path مسار التأرجح release

Observations

The results of the three toy cars are :

Cars	Moved distances
Red car	7 cm.
Blue car	12 cm.
Yellow car	15 cm.

According to the table above, we can observe that :

By increasing the mass of the car, the distance that the paper cup travels increases.

Conclusion

By increasing the mass of an object that moves down a ramp, the kinetic energy of this object increases.

Note

The speed and kinetic energy of a moving object on a ramp can be increased by :

1. Increasing the angle of inclination of the ramp.
2. Increasing the mass of the object.

Check your understanding

Put (✓) or (x) :

1. By increasing the mass of an object that moves down a ramp, its speed decreases. ( )
2. By increasing the mass of an object that moves down a ramp, the kinetic energy of this object increases. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (36)

Exercises on Lesson 4

● Understand ● Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

1. If the angle of inclination of a hill increases, the kinetic energy of an object moving down it will ....
   a. decrease.
   b. increase.
   c. remain as it is.
   d. be destroyed.

2. Which of the following speeds is the most dangerous on the driver's life on collision? ....
   a. a car moves at 50 km/hr. on a flat road.
   b. a car moves at 50 km/hr. on an inclined road.
   c. a car moves at 100 km/hr. on a flat road.
   d. a car moves at 100 km/hr. on an inclined road.

3. All the following factors affect the kinetic energy of a moving car, <u>except</u> ....
   a. the mass of the car.
   b. the pushing force of the car engine.
   c. the airbags inside the car.
   d. the inclination of the road on which the car moves.

4. As the mass of a vehicle increases, it needs .... to ....
   a. less force – less potential energy.
   b. more force – more potential energy.
   c. less force – less kinetic energy.
   d. more force – more kinetic energy.

5. In the opposite figure, the car moves from point (A) to point (B) , so its kinetic energy ....
   a. increases then increases then decreases.
   b. decreases then decreases then increases.
   c. decreases then increases then decreases.
   d. increases then decreases then increases.



6. The following figure shows a ramp and a flat surface of 2 meters length for each. If two toy cars of equal mass are pushed with equal force at the same moment, so ....

a. both cars reach the end of the ramp at the same moment.

b. the yellow car reaches the end of the ramp first.

c. the red car reaches the end of the ramp first.

d. the yellow car has kinetic energy larger than that of the red car.

2 m

2 m

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. The mass of the object 2. The height of the object from Earth's surface 3. The speed of a moving object	a. affects the kinetic energy of the moving object, but doesn't affect its potential energy. b. affects both kinetic and potential energies of the object. c. when it decreases, the kinetic energy increases. d. when it increases, the stored potential energy increases.

1. .... 2. .... 3. ....

3 Put (✓) or (✗) :

1. Similar objects placed at the same height above the Earth's surface, have the same potential energy. ( )
2. The potential energy stored inside a body at 3 meters high is more than that stored inside the same body at 1 meter high. ( )
3. When two similar objects move with the same speed,they have different kinetic energies. ( )
4. The angle of inclination of a ramp doesn't affect the kinetic energy of an object moves on it. ( )
5. When the mass of an object increases, it need less force to move. ( )

4 Correct the underlined words :

1. When the inclination of a ramp decreases, the kinetic energy of a ball rolling down increases. (..............)
2. Kinetic energy of an object doesn't depend on its speed which affects its potential energy. (..............)
3. When an object moves at a very high speed, it has a small amount of kinetic energy. (..............)

5 Complete the following sentences :

1. By increasing the mass of a toy car that moves down a ramp, its kinetic energy will .... , so the time it takes to cover the same distance will ....
2. The speed and .... energy of a moving object on a ramp can be increased by increasing the .... of the ramp.
3. If the angle of inclination of the ramp decreases, the speed of moving objects on it will ....
4. If two trucks move down a hill, the speed of a truck with mass 1 ton will be .... than that of another truck that has mass 2 tons.
5. The kinetic energy of an object sliding down a ramp from height 2 meters is .... than that of the same object when sliding down another ramp from height 4 meters.

6 Give reasons for :

1. A car with mass = 3 tons moves down a hill reaches its bottom faster than another car with mass = 1 ton moves down the same hill.

....

....

2. The speed of a truck is more than that of a car when both of them move down a ramp.

....

7 What happens if ... ?

1. The mass of a toy car that moves down a ramp increases.
(according to the time taken to reach the end of ramp).

....

2. Increasing the angle of inclination of a ramp where a ball moves down on it.
(according to the ball speed).

....

k at the opposite figures that show a toy truck moves n two different ramps, then answer the questions ow :

Ramp (A)

Ramp (B)

Which ramp makes the truck has more speed ?
(Give a reason for your answer).

....

....

there is a small toy car moves on ramp (A) beside e toy truck. Which one of them becomes faster, e car or the truck ?
(Give a reason for your answer).

....

....

....

What happens when increasing the angle of inclination of ramp (B) ?
(according to the speed of the truck).

....

....

a ramp road, there are two vehicles move downward, vehicle (A) of mass on and with speed 70 km/hr. and vehicle (B) of mass 2 tons and with speed km/hr.

cording to these information, put (✓) or (x) in front of the following sentences :

Kinetic energy of vehicle (A) will be smaller than that of vehicle (B). ( )

Kinetic energy of both vehicles will equal zero. ( )

Mass of vehicles affects their kinetic energy. ( )

LESSON

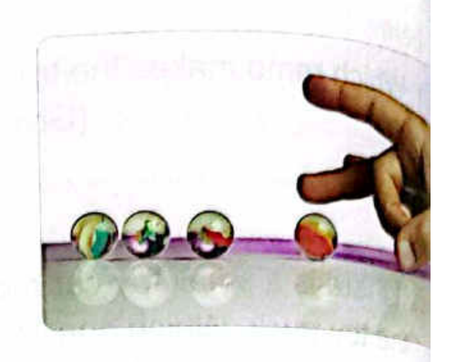
5

Activity 11

Energy Conversions During a Collision

Look at this picture, then put (✓) or (×) :

1. When you push your marble, the kinetic energy of your hand transfers to the marble. (   )
2. During collision between marbles, some of kinetic energy of your marble changes into sound energy. (   )



You have learned that when two objects collide with each other, transfer an changes of energy take place such as :

- When you play a game with marbles, kinetic energy is transferred from your ha to the first marble, then there is another transfer of energy from your marble to t ones you hit.
- Some of the kinetic energy is changed into sound energy when you hear the cli sound during collisions between marbles.

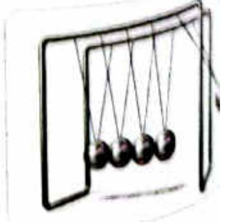
Energy conversions during a collision of Newton's cradle :



- When Newton's cradle ball is raised up without leaving it go, it stores potential energy and doesn't have any kinetic energy.



- When you leave the ball moves in the direction of the rest balls, the potential energy decreases gradually and changes into kinetic energy.
- Most of kinetic energy in the Newton's cradle is transferred from the first ball to the rest of balls, so the number of balls moving on both sides is equal.



- Some of kinetic energy of the first ball is changed into other forms of energy such as sound energy and thermal energy that are produced during collision, where :

 marble بلية Newton's cradle

- Some of this kinetic energy changes into sound energy that is produced during the collision between balls.
- Some of this kinetic energy changes into thermal energy that is produced due to the friction between the string and the other parts of Newton's cradle and also during collision between balls.
- Some of this kinetic energy changes into other forms of energy due to the friction of air with the ball during its movement.

Notes

1. If you leave the moving balls of Newton's cradle long enough, their kinetic energy decreases gradually until they stop after lots of collisions.
2. Energy is conserved during collision, so it cannot be destroyed, but the amount of energy before the collision is equal to the amount of energy after the collision.

Check your understanding

Look at the opposite picture that shows a car collides with a traffic sign post, then complete the following sentences using these words :

(thermal - sound)

1. A part of energy is changed into .... energy that are you can hear.
2. Another part of energy is changed into .... energy due to friction between the car and the traffic sign post.



In the Assessment Book :
Try to answer :
Self-Assessment (37)

خيط conserve

Activity 12 Record Evidence like A Scientist

- **In this concept, you have learned about energy, collisions and the effect of speed and mass on collisions.**

- **Now,** try to think like a scientist by writing your claim, your evidence and your scientific explanation about one of the main points of this concept through the four steps you have learnt in the previous concepts.

Step 1 The Question

What happens to objects when they collide with each other ?

Step 2 My Claim

....

....

....

Step 3 My Evidence

....

....

....

Step 4 My Scientific Explanation

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Optional Digital Activity

Activity 13 **" Crash Investigator "** in the school book is an optional digital activity. You can do this avtivity by scanning its QR code found in your school book.

evidence دليل claim افتراض crash investigator التصادم

Exercises on Lesson 5

● Understand ● Apply ● Analyze ● Evaluate ● Create

1 Choose the correct answer :

• 1. During collision, the energy of the collided objects is ....

a. created and changed.

b. destroyed and transferred.

c. changed and transferred.

d. created and destroyed.

• 2. If two objects collide with each other, the energy after collision is .... the energy before collision.

a. triple b. double c. half d. equal to

• 3. In Newton's cradle, when you move a ball away from the others and not let it go, so .... that is stored in this ball.

a. your potential energy is changed into kinetic energy

b. your kinetic energy is changed into potential energy

c. your sound energy is changed into kinetic energy

d. your sound energy is changed into potential energy

• 4. The kinetic energy in Newton's cradle through the balls travels in ....

a. three different directions.

b. the same direction of movement.

c. two opposite directions.

d. the form of chemical energy.

• 5. When two balls are pushed away at the left side of Newton's cradle, this happens as a result of collision of .... from the right side.

a. one ball b. two balls

c. three balls d. four balls

• 6. When you throw a ball of clay strongly at a wall, there is ....

a. no damage occurs to the ball. b. more damage occurs to the ball.

c. energy is destroyed. d. energy is created.

• 7. At the same speed, a large mass object has .... than that of a small mass object.

a. less potential energy

b. more potential energy

c. less kinetic energy

d. more kinetic energy

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Kinetic energy 2. Potential energy 3. Light energy	a. form of energy that reaches the ear causing hearing. b. type of energy transferred from one moving ball to another rest one in Newton's cradle. c. the energy that doesn't exist in Newton's cradle during collision. d. the energy stored in the first ball of Newton's cradle when you raise it up.

1. .... 2. .... 3. ....

3 Put (✓) or (✗) :

- 1. The moving balls in Newton's cradle will stop after lots of collisions because their kinetic energy is destroyed. ( )
- 2. Some kinetic energy is changed during collisions of balls in Newton's cradle, into sound and thermal energies. ( )
- 3. Among the forms of energy that don't exist in Newton's cradle during collisions are light and chemical energies. ( )
- 4. A smaller and slower object has more kinetic energy than that of a larger and faster object. ( )

4 Correct the underlined words :

- 1. The distance that the balls move on the two opposite sides of Newton's cradle <u>increases</u> gradually as time passes. (....................)
2. In Newton's cradle, the kinetic energy of moving balls <u>increases</u> as time passes. (....................)
3. The number of moving balls at one side of Newton's cradle must be <u>more than</u> those moving at the other side. (....................)
4. The energy produced due to friction between the string and the other parts of Newton's cradle is <u>sound</u> energy. (....................)

5 Complete the following sentences :

- 1. The .... energy changes into .... energy when the Newton's cradle ball moves towards the rest of balls.
- 2. Most of .... energy in the Newton's cradle is transferred from the first ball to the rest of balls.

. When a marble hits another one, some of .... energy changes into .... energy which you can hear.

. During collision between Newton's cradle balls, some of .... energy changes into .... energy due to the .... between the string and the other parts of the cradle.

. Due to .... of air with Newton's cradle balls, some of .... energy changes into other forms of energy.

. In Newton's cradle, when you rise up one ball, it stores .... energy that changes into .... energy when you leave the ball to move.

. The .... energy decreases gradually when you leave the moving balls of Newton's cradle long enough until they ....

Give reasons for :

. You can hear a sound during collision between marbles.

....

. The amount of energy before collision is equal to the amount of energy after collision.

....

What happens if ... ?

1. The Newton's cradle ball is raised up without leaving it go.
(according to its energy).

....

....

2. You let the ball of Newton's cradle move towards the rest of balls.
(according to the change of energy).

....

3. Friction occurs between the string and the other parts of Newton's cradle during collision.
(according to the change of energy).

....

8 **Arrange the following sentences to show the steps of collision of Newton's cradle balls in the correct order.**

(..........) Kinetic energy is transferred from the first ball to the rest of balls.

(..........) Potential energy of the first ball decreases and changes into kinetic energy.

(..........) Kinetic energy of all balls decreases gradually until they stop.

(..........) Raise up the first ball, so it stores potential energy.

---

9 **Look at the opposite figure, then choose the correct answer :**

1. When you push the marble, the .... energy of your hand transfers to the marble.
   a. sound b. thermal
   c. kinetic d. potential

2. During collision between your moving marble and other marbles, some of the .... energy of your marble changes into .... energy.
   a. sound – kinetic b. kinetic – sound
   c. thermal – kinetic d. sound – potential

3. If a marble rolls down a ramp, the speed of the marble decreases by ....
   a. decreasing the angle of the ramp.
   b. increasing the angle of the ramp.
   c. increasing the mass of the marble.
   d. decreasing the width of the ramp.



Activity 14

Review : Energy and Collisions

We can summarize this concept in the following main points :

- When two objects collide with each other, an energy transfer occurs and also changes of energy occur.
- A faster and heavier (more mass) object has more energy, so it causes more damage than a slower and lighter (less mass) object.
- Safty equipment used during collision of cars are **seatbelts** and **airbags**.
- **Seatbelts** are used in cars to keep the driver's body and also the passengers from moving forward when the car stops suddenly.
- **Airbags** slow the speed of the driver moving forward and absorb the energy of the car due to its collision.

Collision:

It is the moment where two objects hit or make contact in a forceful way.

Speed :

It is the distance traveled in a certain amount of time.

$$\text{Speed} = \text{Distance} \div \text{Time} = \frac{\text{Distance}}{\text{Time}}$$

- **Common measuring units of speed :**
  - Meters per second (m/sec).
  - Kilometers per hour (km/hr or kph).
- The object that travels the greater distance in the same amount of time is moving at a greater speed.
- The object that travels the same distance in the smaller amount of time is moving at a greater speed.

- By increasing the force, mass and speed of an object, its kinetic energy increases.
- During collision, there are changes of kinetic energy may be in the form of heat, light or sound.
- The speed and kinetic energy of a moving object on a ramp can be increased by :
  1. Increasing the angle of the ramp.
  2. Increasing the mass of the object.
- Some of kinetic energy in Newton's cradle changes into other forms of energy such as sound energy and thermal energy.

In the Assessment Book :
Try to answer :
Model Exam on Theme 2

Model Exam on Concept (2.3)

Total mark
20

1 (A) Choose the correct answer :

(5 marks)

1. When a car stops suddenly, the passengers move ....
   a. backward.
   b. downward.
   c. upward.
   d. forward.
2. The two factors affecting the kinetic energy of an object are .... of this object.
   a. light and sound energies
   b. mass and color
   c. mass and speed
   d. speed and color
3. If an object moves down along a ramp, as the angle of the ramp increases the speed of the object will ....
   a. increase.
   b. not change.
   c. become zero.
   d. decrease.
4. As the mass of a vehicle increases, it needs .... to move, so to get ....
   a. less force – less kinetic energy.
   b. less force – less potential energy.
   c. more force – more kinetic energy.
   d. more force – more potential energy.

(B) Give a reason for the following :

The speed of the ball increases when the cricket bat hits it hardly.

....

....

2 (A) Put (✓) or (X) :

(5 marks)

1. Some of kinetic energy of balls in Newton's cradle is changed during collisions into sound and thermal energies. ( )
2. Speed = Time ÷ Distance. ( )
3. After car collision, the air bags deflate as fast as they inflate. ( )
4. We cannot create new energy, and also we cannot destroy existed energy. ( )

(B) What happens if ... ?

Two bicycles move in opposite directions collide with each other.

....

3 **(A) Correct the underlined words :** *(5 marks)*

1. All moving objects always have light energy. (........................)
2. Kinetic energy of an object doesn't depend on its speed which affects its potential energy. (........................)
3. The number of moving balls of Newton's cradle must be more than those moving at the other side. (........................)
4. As the mass of a car increases, the damage that occurs during its collisions decreases. (........................)

(B) Arrange the following sentences to show the steps of collision of Newton's cradle balls in the correct order :

(.......) Potential energy of the first ball decreases and changes into kinetic energy.
(.......) Kinetic energy is transferred from the first ball to the rest of balls.
(.......) Rise up the first ball, so it stores potential energy.
(.......) Kinetic energy of all balls decreases gradually until they stop.

---

4 **(A) Write the scientific term of each of the following :** *(5 marks)*

1. A heavy steel ball that swings on a cable and used in destruction of parts of buildings. (........................)
2. The process in which two objects or more crash into each other including an energy transfer. (........................)
3. They are present in car airbags and allow them to deflate fast after collision. (........................)
4. The energy that can be heard and usually produced when two objects collide with each other. (........................)

(B) If there is a crash between a small car and a truck :

In your opinion which one of the two vehicles causes less damage, if you know that the mass of the small car equal 2 tons and the mass of the truck equal 5 tons, knowing that the two vehicles move at the same speed.

....



4th Primary 2023

FIRST TERM

SCIENCE

Assessment Book

By A Group of Supervisors

Content

This Assessment Book

Includes Three Parts

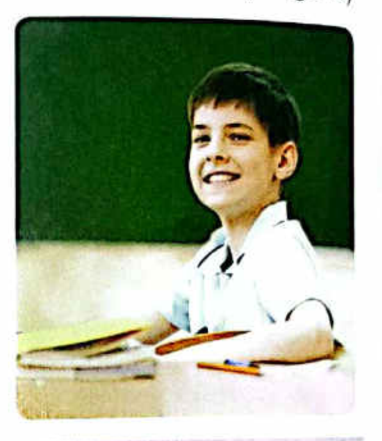
Part 1

Self-Assessments :

(Page 3)

Include :

- Cumulative self-assessments on lessons of each concept.
- Cumulative model exam on concepts.
- A model exam on each theme.



Part 2

Final Examinations :

(Page 63)

Include :

- El-Moasser final examination models.
- Final examinations of some governotates



Part 3

Projects

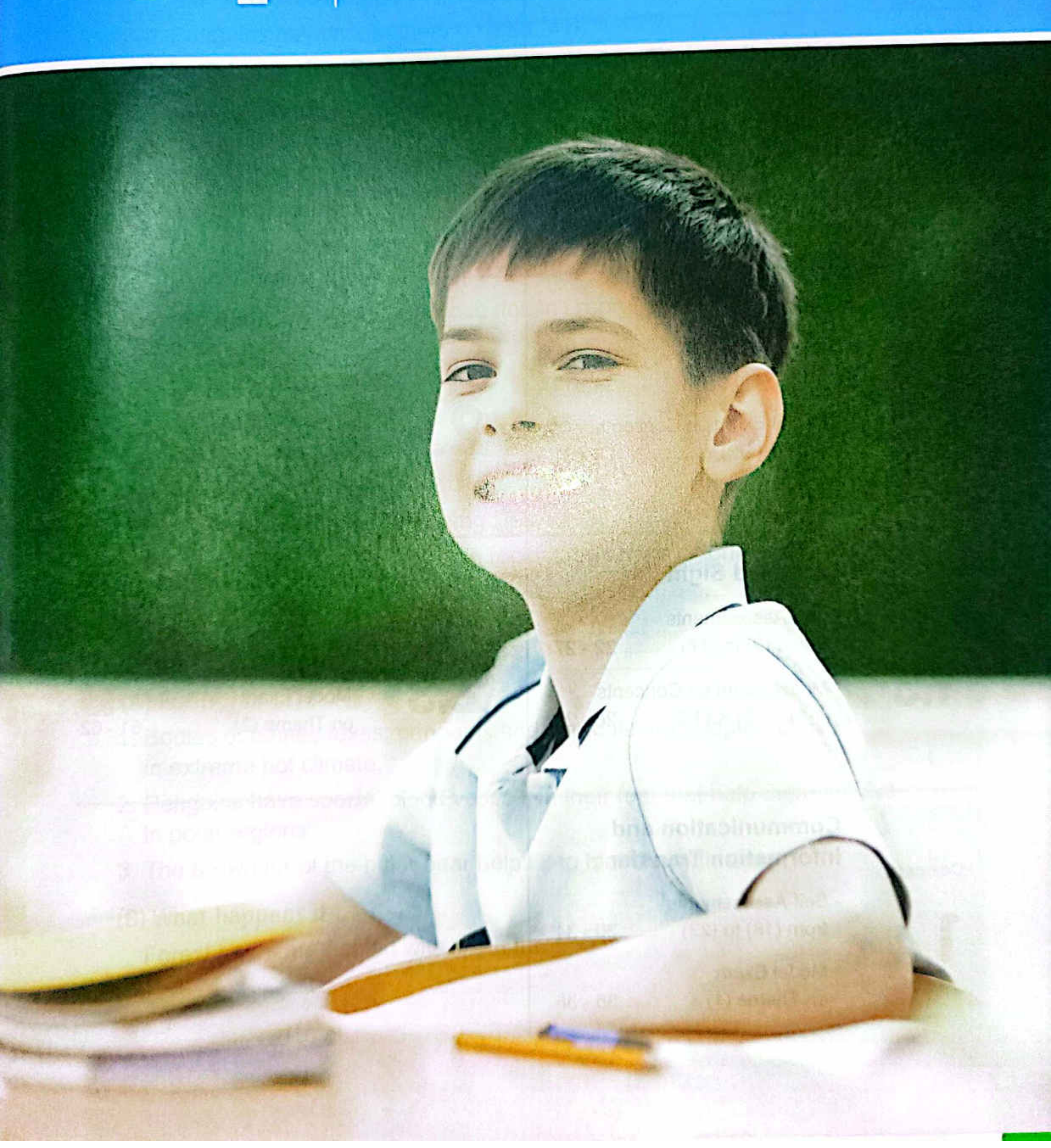
(Page 101)

Include :

- Unit one project.
- Interdisciplinary project.
- Unit two project.



PART 1 Self-Assessments



Self-Assessments

on Concept (1.1)

Self-Assessment 1 On Lesson 1

1 (A) Choose the correct answer :

1. Which of the following statements is correct ? ....
   a. Starred agama lizard live in extreme cold weather.
   b. Penguins have no feathers on their feet.
   c. Forest bears blend in with snow throw their white fur.
   d. Caracals have colorful scales to adapt their desert landscapes.
2. The different colors of fur in different types of bears help them to ....
   a. respire in their environments.
   b. adapt their habitats.
   c. communicate with other animals.
   d. look for shade areas.
3. Which of the following sentences doesn't represent the camouflage adaptation ? ....
   a. Dense feathers of penguins.
   b. White fur of polar bears.
   c. Colored scales of some lizards.
   d. Sandy-colored fur of fennec foxes.

(B) Give a reason for the following :

Some types of lizards that live in rocky areas have colorful scales.

....

....

2 (A) Put (✓) or (X) :

1. Bodies of fennec foxes, penguins and caracals are adapted to live in extreme hot climate. (   )
2. Penguins have special blood vessels in their feet that help them survive in polar regions. (   )
3. The brown fur of the polar bear helps it to blend in with snow. (   )

(B) What happens if ... ?

Forest bears are coated with white fur.

....

....

3 **Look at the opposite figures, then answer the questions below :**

1. Which figure shows the correct structure of blood vessels in the penguin's feet ?

....

2. What would happen if the penguin has the structure of blood vessels shown in figure (a) ?

....

....

Figure (a) Figure (b)

Self-Assessment 2 till Lesson 2

1 **(A) Complete the following sentences :**

1. White fur of polar bear is considered as .... adaptation, while the panting in fennec fox is considered as .... adaptation.
2. Chameleon puffs up its body with air for defense which is considered as .... adaptation, while its V-shaped feet is considered as .... adaptation.
3. Camouflage in fennec fox takes place through its .... colored fur, while in polar bear camouflage takes place through its .... colored fur.

(B) What happens if ... ?

Bull shark has white back and dark belly.

....

2 **(A) Correct the underlined words :**

1. Arctic fox has extra-large ears that help it stays warm. (....................)
2. Bull shark can live in salt water only. (....................)
3. Lizards are from mammals that are an ancient type of animals. (....................)

(B) Write the scientific term of each of the following :

1. It is a change in the behaviors or acts of a living organism to survive. (....................)
2. A property that helps animals to blend in with their surrounding environments. (....................)
3. It is a change in the body structure of a living organism to survive. (....................)

3 **Give two examples of animals which their bodies are covered by brown fur and mention the importance of this fur for each of them :**

1. • First animal is ....
   • Brown fur helps it to ....
2. • Second animal is ....
   • Brown fur helps it to ....

Self-Assessment 3 till Lesson 3

1 **(A) Choose the correct answer :**

1. All of the following are from the characteristics of kapok tree except ....
   a. large leaves.
   b. hand-shaped leaves.
   c. buttress roots.
   d. yellow seeds.
2. Among animals that have camouflage adaptation to hide from their predators are ....
   a. penguin and polar bear.
   b. polar bear and bats.
   c. polar bear and panther chameleon.
   d. panther chameleon and penguin.
3. Wide leaves are considered as adaptations of wetland plants to ....
   a. search for water below soil surface.
   b. get large amount of sunlight.
   c. keep animals away from plants.
   d. resist the water waves.

(B) Give a reason for the following :

The shape of pine tree leaves is like a needle.

....

2 **(A) Complete the following sentences :**

1. The branches of .... tree grow and gather on the top of its trunk to prevent animals from eating them, while .... has tan-colored coat that provides camouflage in sandy, rocky environment.

2. Both of arctic fox and pine tree survive in .... habitat, while both of panther chameleon and kapok tree survive in .... habitat.
3. The thick fur coat helps .... fox hunts in deep snow, while the blood movement in the feet of .... keeps its toes from freezing.

(B) Just as we send messages via mobile, so some types of trees send messages through the wind.

Mention the name of two trees that can send messages through the wind.

....

---

3 Look at the opposite figure, then answer the following questions :

1. Give two examples of animals that live in this habitat.

....

2. Give two examples of plants that live in this habitat.

....

3. Put (✓) or (✗) :

1. Plants of this habitat are characterized by having long, thick roots. ( )
2. Plants of this habitat have large, wide leaves. ( )

Self-Assessment 4 till Lesson 4

1 (A) Choose the correct answer :

1. The trunk in acacia tree stores .... as the hump in the camel stores ....
   a. oil, water. b. water, milk. c. oil, milk. d. water, fat.
2. All of the following sentences are correct about stomach, except ....
   a. it has teeth and tongue.
   b. it receives the food from esophagus.
   c. food changes into soupy liquid inside it.
   d. it contains an acid.
3. All of the following organs belong to the respiratory system, except ....
   a. nose. b. two bronchi. c. two lungs. d. stomach.

(B) Give a reason for the following :

Saliva is very important in your mouth.

....

2 **(A) Put (✓) or (X) :**

1. Caracal and fennec fox can hide in the desert as they have white-colored fur. ( )
2. Bodies of starred agama and panther chameleon are covered with scales. ( )
3. Digestion process begins in the stomach with the help of saliva. ( )

(B) What happens if ... ?

The small intestine was not supplied with blood vessels in the human body.

....

3 **Study the opposite diagram, then answer the questions. Knowing that through tube (A) air passes, while through tube (B) food passes :**

1. Tube (A) represents the ....
2. Tube (B) represents the ....
3. Tube (A) connects throat to the ....
4. Tube (B) connects throat to the ....
5. Tube (A) belongs to .... system, while tube (B) belongs to .... system.

Throat (Pharynx)
Tube (A)
Tube (B)

Self-Assessment 5 till Lesson 5

1 **(A) Choose the correct answer :**

1. Air is important for human, fish and animals because ....
   a. it contains carbon dioxide gas that is important for breathing.
   b. it contains carbon dioxide gas that is important for digestion.
   c. it contains oxygen gas that is important for breathing.
   d. it contains oxygen gas that is important for digestion.
2. Cutting down rainforests, may help human to make furniture, but also may cause disappearance of ....
   a. starred agama. b. bull shark.
   c. panther chameleon. d. polar bear.
3. All of the following living organisms need food and can get oxygen gas from air to obtain energy, except ....
   a. fennec fox. b. bull sharks. c. pine trees. d. humans.

(B) Give a reason for the following :

Air pollution is dangerous for humans, while water pollution is dangerous for fish and humans.

....

....

2 **(A) Put (✓) or (✗) :**

1. Human can pollute the environment, but he cannot restore it. ( )
2. Both lungs and gills are organs that present in the digestive system of both human and fish. ( )
3. When an ecosystem is completely polluted, no longer organisms can live in it. ( )

(B) Write one animal and one plant that live in each environment of the following :

Environment	Animal	Plant
1. Desert :	....	....
2. Rainforest :	....	....
3. Polar region :	....	....
4. Salt water :	....	....

3 **Give only one example of structural adaptation in each of the following :**

1. Acacia tree : ....

....

2. Fish : ....

....

3. Polar bear : ....

....

Self-Assessment 6 till Lesson 6

1 **(A) Cross out the odd word :**

1. Frog – Starred agama lizard – Salamander – Toad. (....................)
2. Water lily – Fish – Palm tree – Amphibian. (....................)
3. Golden frog – Panther chameleon – Kapok tree – Acacia tree. (....................)

(B) Give a reason for the following :

Amphibians are endangered species.

....

....

2 (A) Write the scientific term of each of the following :

1. A type of living organisms that can breathe in air and in water. (....................)
2. An organ with structural adaptation that enables toad to breathe in water. (....................)
3. The grassland habitat of acacia tree, in which we cannot found amphibians during dry seasons. (....................)

(B) If you are one of the scientists who help amphibians survive. You can do all of the following for their habitats, except ....

a. removing air pollutants.

b. removing water pollutants.

c. removing their natural predators.

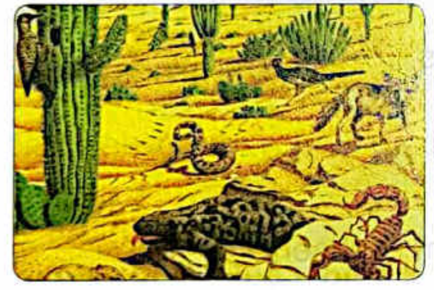
d. removing water from ponds and streams.

(Give a reason for your choice)

....

....

3 Look at the following two pictures, then answer the questions [by writing habitat (A) or habitat (B)] :



Habitat (A)



Habitat (B)

1. Starred agama lizard and fennec fox live in ....
2. We can find panther chameleon in ....
3. Amphibians cannot live in ....
4. Yellow body coats is most common in ....
5. Dry seasons is more dangerous for ....
6. Cutting down forest usually occurs in ....
7. The suitable ecosystem for barbary fig is ....
8. Caracal can live in ....
9. Arctic fox cannot be found in ....
10. Kapok tree can grow in ....

Model Exam

on Concept (1.1)

Total mark

—
20

1 **(A) Complete the following sentences using the words below :** *(5 marks)*

(blood vessels – expands – cool – mild)

1. A burrow is an excellent place for the fennec fox to stay .... during the day.
2. During exhalation, the diaphragm .... and moves upward.
3. Savannah is a grassland habitat with a .... temperature.
4. The .... in the gills of fish carry oxygen gas to the rest of the body.

(B) Give a reason for the following :

Starred agama lizard and golden frog are two different species.

....

....

2 **(A) Put (S) in front of structural adaptation and (B) in front of behavioral adaptation for each of the following statements :** *(5 marks)*

1. Bull shark can hunt in salt water and fresh water. (....................)
2. Black bear has dark fur. (....................)
3. Acacia tree used wind to send messages. (....................)
4. Blood vessels in the penguin's feet. (....................)

(B) What happens if ... ?

One of the organs of the digestive system is absent.

....

3 **(A) Choose from columns (B) and (C) what suit them in column (A) :** *(5 marks)*

(A) Living organism	(B) Habitat	(C) Way of breathing
1. Lizard	a. Land and water	A. Takes in oxygen from air only
2. Fish	b. Desert	B. Takes in oxygen from water only
3. Frog	c. Water	C. Takes in oxygen from air and water

1. ...... → ......   2. ...... → ......   3. ...... → ......

(B) Write the scientific term of each of the following :

1. Little air sacs surrounded by blood vessels in the respiratory system. (....................)

2. An animal changes its fur color between winter and summer seasons. (....................)

---

4 (A) Choose the correct answer : *(5 marks)*

1. The stomach has an acid that helps in ....
   a. crushing of food.
   b. digestion of food.
   c. absorption of digested food quickly.
   d. absorption of water from undigested food.

2. Water lily has wide floating leaves to ....
   a. prevent the loss of water. b. resist the water waves.
   c. absorb a large amount of sunlight.
   d. absorb a large amount of water.

3. All of the following living organisms live in desert, <u>except</u> ....
   a. palm tree. b. pine tree.
   c. starred agama lizard. d. fennec fox.

4. Amphibians absorb oxygen directly from water by their ....
   a. skin. b. gills. c. lungs. d. nose.

(B) Correct the underlined words :

1. Gills are unique <u>behavioral</u> adaptation that allow fish to breathe under water. (....................)

2. <u>Small intestine</u> is a long muscular tube that moves food down into the stomach. (....................)

Self-Assessments

on Concept (1.2)

Self-Assessment 7 On Lesson 1

1 (A) Complete the following sentences:

1. Dolphins use echolocation property that help them to .... and ....
2. Human use senses of .... and .... when watching a football game at television.
3. Chameleons use their .... to see the food, while they have a very long .... to help them catch and taste insects.

(B) Give a reason for the following :

Dolphins can locate their preys under water.

....

....

....

2 (A) Put (✓) or (✗) :

1. The owl uses the sense of touch to hunt its prey at night. ( )
2. Fox has good senses of hearing and sight so that it can avoid danger. ( )
3. A dog uses its sense of smell and sight to identify its owner. ( )

(B) Look at the opposite figure, then answer the following questions:

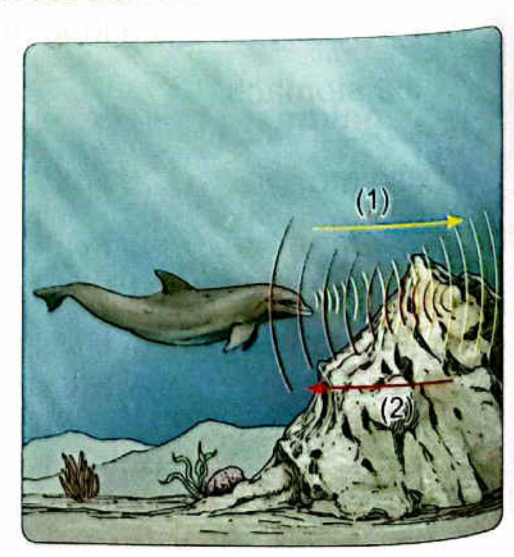
1. Mention the three senses that you use to identify the food in this picture.

....

2. What is the sense used to tell if this food has too much salt or not ? And which organ is responsible for it ?

....

3 Observe the following figure, then choose the correct answer :



1. Arrow number (1) represents ....
   a. sound waves produced by the dolphin.
   b. the echo bounced back from the rock.
   c. light waves produced by the dolphin.
   d. light waves produced by the rock.
2. Arrow number (2) represents ....
   a. sound waves produced by the dolphin.
   b. the echo bounced back to the dolphin.
   c. light waves produced by the dolphin.
   d. light waves bounced back to the dolphin.

3. The dolphin uses this property to ....
   a. see objects under water.
   b. see objects above the water surface.
   c. locate objects and living organisms on the beach.
   d. locate objects and living organisms under water.

4. The sense used by the dolphin in the previous picture is the ....
   a. smell. b. taste. c. hearing. d. sight.

Self-Assessment 8 till Lesson 2

1 (A) Choose the correct answer :

1. An animal that flies and relies on the bouncing of sound to catch its prey is a/an ....
   a. owl. b. snake. c. bat. d. dolphin.

2. Bats and dolphins are animals that greatly different in size, but they have one thing in common as they both ....
   a. live in the same environment.
   b. feed on the same prey.
   c. depend on echolocation property in their hunting.
   d. depend on gills to breathe.

3. The Egyptian mongoose makes a group of sounds that ....
   a. bounce back to it when it hits a wall or its prey.
   b. is similar to the sounds made by dolphins and bats.
   c. can be heard by tasting.
   d. is the language of communication with other mongooses.

(B) Give a reason for the following :

The nerves spread across the whole body.

....

....

2 (A) Put (✓) or (✗) :

1. A dolphin produces sound waves so it can locate its prey through echo. ( )
2. An owl can rotate its head in all directions. ( )
3. Nocturnal animals become active at morning to look for their food. ( )

(B) Read the following paragraph, then correct the underlined words :

When you hear a fire alarm, that means you have received this information through sensory receptors in the eye, then nerves sent a signal to the heart, where this signal travels as sound impulses.

....

3 Place each of the following animals in front of the sentence that describes it :

(Dolphins – Owls – Snakes – Bats)

1. .... can fly but cannot see well in the dark.
2. .... rely on the heat produced by the prey's body to hunt it at night.
3. .... are nocturnal birds with bowl-shaped faces.
4. .... live in water and rely on echolocation to find food.

Self-Assessment 9 till Lesson 3

1 (A) Choose the correct answer :

1. The nervous system of ...., such as elephants and dogs, consists of brain, spinal cord and nerves.

   a. rodents b. birds c. mammals d. reptiles

2. .... can detect and amplify distant sounds due to their heads that look like bowls.

   a. Owls b. Dogs c. Mongooses d. Chameleons

3. If you are in your room, you can tell what kind of food is being prepared in the kitchen by using your sense of ....

   a. sight. b. hearing. c. touch. d. smell.

(B) What happens if ...?

The hind legs of jerboa are short.

....

....

2 (A) Correct the underlined words :

1. The jerboa's reaction time is very slow. (......................)
2. You can distinguish between quiet and loud music depending on your sense of sight. (......................)
3. Nerves are an important part of the digestive system. (......................)

(B) Give a reason for the following :

Dolphins have super sensory organs.

....

3 Observe the following figures, then complete the following setences :

Animal (1)   Animal (2)

1. During night, animal .... can locate animal .... by the heat produced from its body.
2. Animal .... can sense animal .... based on its large ears, which have sensory receptors able to sending a message through a network of nerves to its brain.
3. During night, the activity of animal .... is an example of a behavioral adaptation, while large ears of animal .... are an example of a structural adaptation.

Self-Assessment 10 Lesson 4

1 (A) Choose the correct answer :

1. In an animal, if the reaction time is very long, so that the animal..........
   a. will survive. b. will reproduce.
   c. will be at risk of extinction. d. will run away quickly.
2. The nervous system plays an important role in ....
   a. obtaining energy from food.
   b. obtaining energy from oxygen.
   c. absorbing food from small intestine.
   d. responding to different stimuli.
3. If the sensory receptors in the tongue are damaged completely, this person's ability to taste food will ....
   a. increase. b. disappear. c. decrease. d. not change.

(B) In which case will your reaction time be faster ? And why?

Running when you hear a wild animal coming towards you – Running when you see a wild animal coming towards you.

....

....

2 **(A) Write the scientific term of each of the following :**

1. The time taken by an organism's body to react to different information around it. (........................)
2. The type of impulses in which the information messages transmit through nerves from the sensory organs to the brain. (........................)
3. Special type of nerves found in sensory organs and responsible for sending messages to the brain. (........................)

(B) A hunter was trying to catch a deer but he was not being careful to not make any noise or movement, so the deer was escaped.

In your opinion, what happened in the deer's nervous system that helped it to escape?

....

....

3 **Order the following statements that illustrate how the rabbit's brain processes running away from the fox before predating it :**

(..............) The rabbit's brain processes information.

(..............) The rabbit's nerves sent a signal to the brain.

(..............) The rabbit's brain sent a signal to its feet muscles to escape.

(..............) The rabbit saw a fox moving towards it to devour it.

Self-Assessment 11 till Lesson 5

1 **(A) Choose the correct answer :**

1. When you see an orange falling from a tree to the ground, which of your senses could the brain process its signals fast in this situation ? ....
   a. Hearing. b. Touch. c. Sight. d. Smell.
2. When your leg hits a rock while walking down in a street, the sensory receptors in your leg send a message to your brain through a network of nerves passing through the ....
   a. esophagus. b. trachea. c. lungs. d. spinal cord.
3. Both dolphins and owls have sharp sense of ....
   a. sight. b. hearing. c. smell. d. touch.

(B) Give a reason for the following :

An owl can detect and amplify distant sounds and direct them to its ears.

....

....

2 **(A) Correct the underlined words :**

1. The rely of bats on echolocation to find insects at night is considered as a <u>behavioral</u> adaptation. (..........................)
2. When the echo bounces back to the dolphin, its sensory receptors send a message to the <u>heart</u> through a network of nerves, telling it where its prey is. (..........................)
3. A snake can locate a jerboa at night through the <u>light</u> produced from the jerboa's body. (..........................)

(B) Circle the organism that has a sharp sense of hearing from the following organisms :

1. Egyptian jerboa.	2. Snake.	3. Bat.
4. Fennec fox.	5. Human.	6. Dolphin.

3 **Put (✓) in front of the correct statements related to the owl, then classify the selected sentences into structural and behavioral adaptations by writing the sentence number in the table below :**

1. Its head is covered with feathers. (   )
2. It is from reptiles. (   )
3. It has a sharp sense of hearing. (   )
4. It becomes active at night to catch its prey. (   )
5. Its body is covered with scales. (   )
6. It turns its head in all directions. (   )

Type of adaptation	Sentence number
1. Structural adaptation :	....
2. Behavioral adaptation :	....

Model Exam

on Concepts (1.1) & (1.2)

Total mark

20

1 (A) Choose the correct answer : *(5 marks)*

1. The ability to sense heat of the preys' bodies is a super sensory adaptation of ....
   a. bats. b. snakes. c. chameleons. d. owls.
2. The role of teeth in digestion process is ....
   a. mixing the food. b. crushing the food.
   c. swallowing the food. d. moistening the food.
3. The super sense of dolphin is the sense of ....
   a. smell. b. sight. c. touch. d. hearing.
4. Palm tree has tiny leaves like ....
   a. pine tree. b. kapok tree. c. acacia tree. d. water lily plant.

(B) What happens if ... ?

Fennec fox has short ears and legs.

....

2 (A) Put (✓) or (✗) : *(5 marks)*

1. Hand-shaped leaves of kapok tree is considered as a structural adaptation. ( )
2. The bones carry information from sensory organs to the brain in the form of electrical impulses. ( )
3. Amphibians include frogs, starred agama and salamanders. ( )
4. The brain can process what we hear slower than what we see. ( )

(B) Cross out the odd word :

1. Nerves – Small intestine – Brain – Spinal cord. (..................)
2. Stomach – Diaphragm – Esophagus – Large intestine. (..................)

3 (A) Choose from columns (B) and (C) what suit them in column (A) : *(5 marks)*

(A) Living organism	(B) Species	(C) Habitat
1. Bull shark	a. Reptile	A. Savannah
2. Starred agama	b. Amphibian	B. Salt and fresh water
3. Acacia	c. Fish	C. Wet environment
4. Frog	d. Plant	D. Desert environment

1. ...... → ...... 2. ...... → ...... 3. ...... → ...... 4. ...... → ......

(B) Give a reason for the following :

The spinal cord has an important function in the nervous system.

....

....

4 (A) Complete the following sentences using the words below : ***(5 marks)***

(penguin – reflex – reaction time – oxygen gas)

1. Moving your hand away when touching a very hot cup of tea is called ....
2. Living organisms need food and .... to obtain energy.
3. Among animals that can live in polar environment are .... and polar bear.
4. The time taken by a boy to move quickly his hand away, when he touches the spines of a cactus plant is called ....

(B) Correct the underlined words :

1. Fish use lungs to take oxygen out of the water. (..........................)
2. The spinal cord is the main control center in the body. (..........................)

Self-Assessments

on Concept (1.3)

Self-Assessment 12 On Lesson 1

1 **(A) Put (✓) or (✗) :**

1. Sensory receptors in eyes send electric impulses to the brain for processing information. ( )
2. The membrane that presents on the back of cat eyes depends on echo to detect the prey location. ( )
3. Fishing cat has excellent night vision better than human. ( )

(B) Give a reason for the following :

The eye of fishing cat has the ability to collect more available light at night.

....

2 **(A) Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Snake 2. Fishing cat 3. Human	a. has strong wings, that help it to fly. b. can feel the warm of prey body at night. c. has night vision better than snake and lower than fishing cat. d. has a mirror-like membrane on the back of its eye.

1. .... 2. .... 3. ....

(B) Read the following paragraph, then correct the underlined words :

The hunt at night needs super sensory adaptations in predators, such as sense of <u>taste</u> in fishing cat and sense of <u>sight</u> in bat, that are <u>weaker</u> than those in human, so they can hunt at night.

....

....

....

3 **Choose the correct answer :**

1. If the human eyes contain a mirror-like membrane like which is found in fishing cat eyes, so all the following statements are correct, <u>except</u> ....
   a. human eyes seem to glow at night.
   b. human eyes have excellent night vision.
   c. human eyes don't need night vision goggles.
   d. human eyes need a strong source of light to can see at night.

2. All the following have structural adaptation in their ears to strong the sense of hearing for them except ....

a. fennec fox. b. arctic fox. c. owl. d. snake.

3. Which of the following animals has the ability to fly but can't see at night ? ....

a. Owl. b. Snake. c. Bat. d. Fennec fox.

4. All the following have structural adaptation in their sense of sight, so it is strong except ....

a. owl. b. fishing cat.

c. panther chameleon. d. bat.

Self-Assessment 13 till Lesson 2

1 (A) Choose the correct answer :

1. All of the following are nocturnal animals, except ....

a. fishing cats. b. bats.

c. barbary fig. d. tarsiers.

2. The eyes can move in their sockets and the pupil is not adapted to night vision in ....

a. tarsiers. b. owls. c. cats. d. humans.

3. The pupils of human eyes open .... that of nocturnal animals.

a. typical to b. narrower than c. wider than d. similar to

(B) What happens if ... ?

Human has the same structure of nocturnal animals eyes.

....

2 (A) Put (✓) or (✗) :

1. If the human has the same eye structure of fishing cat, so he doesn't need night vision goggles to see in the dark. ( )

2. If there is a little light in a dark room, you can see an object in this room when your eyes adjusted to the darkness. ( )

3. There are some similarities between owls and tarsiers in structural adaptation of their eyes to the darkness. ( )

(B) Give a reason for the following :

Nocturnal animals can see better than humans at night.

....

3 Write the name of the animal in front of each sentence using the following words :

(Owl – Fishing cat – Dolphin – Bat – Tarsier)

1. You can see its eyes glow at night. (............)
2. It uses echo to hunt fish. (............)
3. It has the same structure of eye as owl but can't fly. (............)
4. The shape of its face collects and amplifies different sounds. (............)
5. It flies at night and hunts by receiving echo bouncing off its prey. (............)

Self-Assessment 14 till Lesson 3

1 (A) Choose the correct answer :

1. All the following organisms have tapetum lucidum, except ....
   a. snakes. b. fishing cats. c. dogs. d. horses.
2. Night vision goggles look like .... that present in nocturnal animals.
   a. brain b. nerves
   c. tapetum lucidum d. blood vessels
3. Nocturnal animals depend on all the following senses to find their prey at night, except ....
   a. sight sense. b. hearing sense. c. taste sense. d. smell sense.

(B) Give a reason for the following :

Tapetum lucidum works like a mirror.

....

2 (A) Put (✓) or (✗) :

1. Some animals have mirror-like membrane, so their eyes glow at night. ( )
2. Pupils of eyes present in nocturnal animals and absent in humans. ( )
3. In complete darkness, the eyes of cats doesn't glow. ( )

(B) Cross out the odd word :

1. Owl – Fishing cat – Snake – Tarsier. (............)
2. Cat – Dog – Deer – Bat. (............)

3 If there is a wild cat moves around in a forest at night. Choose the correct answer :

1. The eyes of this wild cat look shine at night because it has..........
   a. huge eyes. b. tapetum lucidum.
   c. large ears. d. long legs.
2. All the following animals can see this wild cat, except ....
   a. tarsier. b. fishing cat. c. bat. d. owl.
3. Which of the following animals the wild cat can't recognize it ? ....
   a. Tarsier. b. Chameleon. c. Snake. d. Jerboa.

Self-Assessment 15 till Lesson 4

1 (A) Put (✓) or (✗) :

1. You can see a green ball inside a transparent glass box. ( )
2. Opaque objects allow light to pass through and we can see objects through them. ( )
3. In a completely dark room, we can see the transparent objects but opaque objects cannot be seen. ( )

(B) Give a reason for the following :

You can see clearly through lens.

....

2 (A) Choose from column (B) what suits it in column (A) :

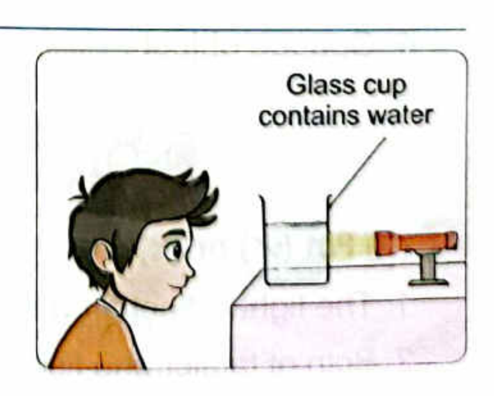
(A)	(B)
1. Water 2. Glass 3. Wood	a. It is an opaque material, that reflects light in different directions. b. It is a source of light energy. c. It is a transparent material that is used in making windows. d. It is a transparent liquid material.

1. .... 2. .... 3. ....

(B) Cross out the odd word :

1. Mirror – Cloth – Paper – Brick. (.............)
2. Wood door – Book – Wall – Glass cup. (.............)

3 Look at the opposite figure, then answer the questions below :



1. Can you see the light from another side of cup ?

....

2. From this activity, we can conclude that ....
   a. water and glass are opaque objects.
   b. water and glass are transparent objects.
   c. water is an opaque object, while glass is a transparent one.
   d. glass is an opaque object, while glass is a transparent one.

Self-Assessment 16 till Lesson 5

1 (A) Complete the following sentences:

1. The Moon doesn't emit its own light, but it .... the light falling on it.
2. Plastic, wood and paper reflect .... amount of light rays.
3. Smooth surfaces reflect light in .... direction with the .... angle at which they strike the object originally.

(B) What happens if ... ?

You place an opaque object between a light source and a wall.

....

2 (A) Put (✓) or (✗) :

1. In complete darkness, nocturnal animals depend on sense of sight to move and avoid predators. ( )
2. Tarsier has huge head like owl to gather and reflect any light. ( )
3. Things cannot be seen through transparent objects. ( )

(B) Give a reason for the following :

The pupils of cat eyes open wider than the pupils of human eyes.

....

3 Give one example of each of the following :

1. Smooth surface : ....
2. Transparent object : ....
3. Rough surface : ....
4. Opaque object : ....

Self-Assessment 17 till Lesson 6

1 (A) Put (✓) or (✗) :

1. The light reflection depends on smoothness of the object's surface. ( )
2. Both of tarsier and fishing cat can turn their heads 180 degrees. ( )
3. Cats have excellent night vision, while snakes and bats are not. ( )

(B) What happens if ... ?

The structure of fishing cats eyes is the same like humans.

....

2 (A) Write the scientific term of each of the following :

1. The organ that is responsible for processing information received by eyes, to know and recognize the surroundings. (....................)
2. A species of wild cats whose eyes glow at night. (....................)
3. A type of surface that reflects light in different directions. (....................)

(B) Give a reason for the following :

Bat can find its food at night although it has a weak sense of sight.

....

3 Choose the correct answer :

1. If there are two sheets, one is made of wood and the other is made of glass, ...
   a. you can see the glass sheet through the wood sheet.
   b. you cannot see the wood sheet through the glass sheet.
   c. you can see the wood sheet through the glass sheet.
   d. light can pass through both sheets.
2. Each of human, fishing cat and tarsier, ...
   a. has an excellent night vision.
   b. becomes more active at night.
   c. has a mirror-like membrane in eyes.
   d. has two eyes adapted for vision.
3. Mirror causes falling light rays to ....
   a. pass through it.
   b. reflect at the same angle they strick the mirror.
   c. reflect in different directions.
   d. diffuse like that of rough surfaces.
4. The pupils of human eyes open .... that of nocturnal animals.
   a. typical to
   b. narrower than
   c. wider than
   d. similar to

Model Exam

on Concepts (1.1) , (1.2) & (1.3)

Total mark

20

1 (A) Answer the following questions by using the words below : *(5 marks)*

(Human – Fishing cat – Owl – Chameleon)

1. Which of them can make camouflage adaptation ? (....................)
2. Which of them has tapetum lucidum layer ? (....................)
3. Which of them can move its head in all directions to see its prey ? (....................)
4. Which of them can use night vision goggles to see at nighttime ? (....................)

(B) Give a reason for the following :

Diaphragm plays an important role in respiration process.

....

....

2 (A) Choose from column (B) what suits it in column (A) : *(5 marks)*

(A)	(B)
1. Fishing cat	a. has poor night vision, so it depends on feeling the heat of prey's body.
2. Owl	b. lives in water and depends on the sound that bounces off prey's body.
3. Bat	c. has poor night vision, so it depends on the sound that bounces off prey's body.
4. Snake	d. has excellent night vision and its eyes glow at night.
	e. has extraordinary sight at night and bowl-shaped face.

1. .... 2. .... 3. .... 4. ....

(B) What happens if ... ?

The polar bear has a thin fur instead of its thick fur.

....

....

3 (A) If there is a small green lizard in a place with weak light levels. *(5 marks)*

Answer the following questions :

1. Which of the following animals can see and hunt it ? ....
   a. Bat. b. Snake. c. Tarsier. d. Dolphin.
2. Which of the following living organisms can hear its quiet movements and hunt it ? ....
   a. Snake. b. Owl. c. Dolphin. d. Human.

3. If this green lizard stands between some green leaves and don't move completely. Which of the following living organisms can hunt it easily ? ....

a. Fishing cat. b. Human. c. Tarsier. d. Snake.

(B) Put (✓) or (✗) :

1. All living organisms need food and oxygen gas to get energy. ( )
2. The membrane that presents on the back of a fishing cat eyes doesn't present in other cat species. ( )
3. Animals can't eat barbary fig due to its sharp spines. ( )

---

4 (A) Write the scientific term of each of the following : *(5 marks)*

1. A device that human can depend on to see in the dark. (....................)
2. It is a characteristic that helps living organisms to survive and reproduce in the ecosystem in which they live. (....................)
3. It is time taken by a jerboa's body to react to danger. (....................)
4. Objects that don't allow light to pass through. (....................)

(B) Correct the underlined words :

1. The brain is a part of the respiratory system. (....................)
2. Nocturnal animals have smaller eyes than humans. (....................)

Self-Assessments

on Concept (1.4)

Self-Assessment 18 On Lesson 1

1 **(A) Put (✓) or (X) :**

1. Fireflies form different flash patterns by using their legs. ( )
2. Speaking is the only way to communicate with people. ( )
3. Using flashing LED lights to imitate the fireflies patterns is an example of the interaction between humans and nature. ( )

(B) Give a reason for the following :

The wings of fireflies play an important role in the communication between them.

....

....

2 **(A) Correct the underlined words :**

1. Changing the flash patterns of fireflies is considered as a structural adaptation. (.....................)
2. A cell phone is a device that is used in communication between animals. (.....................)
3. Reading is a type of communication that depends on the sense of taste. (.....................)

(B) How can fireflies insects produce light to communicate with each other ?

....

....

3 **Choose the correct answer :**

1. Both humans and animals can use all the following types of communication, except .... which are used by humans only.
   a. sounds b. lights c. movements d. cell phones
2. Which of the following is not a reason for fireflies produce a flash light ? ....
   a. To attract a mate. b. For communication.
   c. To warn off predators. d. To hear in the dark.
3. .... is considered a type of communication used by animals only.
   a. Writing b. Echolocation c. Reading d. Cell phone
4. A firefly is not a bird, but it is a type of ....
   a. amphibians. b. lizards. c. beetles. d. reptiles.

Self-Assessment 19 till Lesson 2

1 (A) Choose the correct answer :

1. All the following living organisms use the sense of hearing to communicate with each other, except ....
   a. dolphins. b. whales. c. fireflies. d. bats.
2. Some living organisms can use light energy in communication such as ....
   a. whales. b. fireflies. c. dolphins. d. snakes.
3. The .... is the only living organism that can use language and speech to communicate with each other.
   a. whale b. owl c. firefly d. human

(B) Give a reason for the following :

The humpback whales produce low-pitched sounds during feeding season in summer.

....

2 (A) Put (✓) or (✗) :

1. Humpback whales produce high-pitched sound during summer season. ( )
2. Writing is a type of communication that is used by human only. ( )
3. It is possible for a human to interact with firefilies. ( )

(B) Mention the name of two sea animals that use sound energy in their communication.

....

3 Humpback whales can sing different songs as well as the human singers.

1. What is the difference between their songs in winter and in summer. (concerning sound pitch)

   ....

2. If you know that both of humpback whales and dolphins have lungs.
   a) Do you think that humpback and dolphins can respire under water like fish ?

   ....

   b) What is the name of the gas that they respire ?

   ....

Part 1

Self-Assessment 20 till Lesson 3

1 **(A) Complete the following sentences :**

1. Morse code can depend on the sense of .... or ....
2. Morse code and language depend on the sense of .... in communication.
3. Both fireflies and rescue flare depend on .... energy for communication.

(B) What happens if ... ?

The winter months started according to the communication of humpback whales.

....

2 **(A) Correct the underlined words :**

1. Morse code uses dashes and question marks, that represent different letters of the alphabet. (....................)
2. The winter months are considered as the feeding season for humpback whales. (....................)
3. Both Morse code and humpback whales depend on the sense of smell in communication. (....................)

(B) Mention two types of energy that Morse code depends on them.

....

3 **Based on Morse code in front of you, Mona can write her name as follows :**

M	O	N	A
– –	– – –	– •	• –

A • –	N – •
B – • • •	O – – –
C – • – •	P • – – •
D – • •	Q – – • –
E •	R • – •
F • • – •	S • • •
G – – •	T –
H • • • •	U • • –
I • •	V • • • –
J • – – –	W • – –
K – • –	X – • • –
L • – • •	Y – • – –
M – –	Z – – • •

Morse code

1. How can Ramy write his name using Morse code ?

R	A	M	Y

2. How can you write your name using Morse code ?

Self-Assessment 21 till Lesson 4

1 (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Fireflies	a. depend on the sense of smell in their communication.
2. Humpback whales	b. depend on the sense of taste in their communication.
3. Ants	c. depend on the sense of sight in their communication.
	d. depend on the sense of hearing in their communication.

1. .... 2. .... 3. ....

(B) Give a reason for the following :

Hikers always take mirrors with them during their travelling.

....

2 (A) Write the scientific term of each of the following :

1. It is a code that uses symbols in a pattern and their arrangement form a word with a meaning. (......................)
2. It is an insect that makes a movement in figure-eight pattern in communication. (......................)
3. It is a pattern that has meaning. (......................)

(B) Mention the name of two insects that use the sense of sight to communicate with each other.

....

3 Read the following paragraph, then answer the questions :

If there is a family formed of father, mother and one child. Father always protects his family from any external danger . Mother goes to the market to buy food for the family. Sometimes the child warns his mother that there is only a small piece of cheese left in the fridge.

- According to your study to the life of ants. Complete the following sentences to show which character in the previous paragraph represents each of the following :

a. .... represents the nurse ant.

b. .... represents the scout ant.

c. .... represents the soldier ant.

Self-Assessment 22 till Lesson 5

1 (A) Complete the following sentences :

1. Both of the special cane of a blind person and humpback whales during winter produce .... pitched sound during communication.
2. The special cane of a blind person depends on .... sense while fireflies depend on .... sense in communication.
3. Light can be used instead of .... in Morse code.

(B) Give a reason for the following :

People use signal fires.

....

2 (A) Put (✓) or (✗) :

1. The special cane of a blind person is like humpback whales in that both of them use echolocation. ( )
2. Both honeybee and ant depend on the sense of smell in their communicaton. ( )
3. According to Morse code we can use light energy and sound energy in communication. ( )

(B) Mention two living organisms that use smelly messages in there communication.

....

3 Look at the following photos, then answer the questions :

Fig. (1)
Night-vision goggles

Fig. (2)
Blind person's cane

1. Device in figure (..........) is used to help people to see in low light areas.
2. Device in figure (..........) is used by blind people.
3. Device in figure (..........) is inspired from bats.
4. Device in figure (..........) is inspired from cats.

Model Exam

on Theme (1)

Total mark

20

1 (A) Choose the correct answer : *(5 marks)*

1. The presence of thick white fur is a structural adaptation in ....
   a. fennec fox. b. starred agama lizard.
   c. forest bear. d. polar bear.

2. To describe the bag color of your friend, you should use the sense of ....
   a. taste. b. sight. c. touch. d. smell.

3. The fishing cats eyes glow due to the presence of ....
   a. the behavioral adaptation with the surroundings.
   b. the main control centre of their bodies.
   c. the light that bounces off the surroundings.
   d. the light that bounces off the membrane on the back of their eyes.

4. Writing and reading are common types of communication in .... world.
   a. reptiles b. humans c. plants d. birds

(B) What happens if ... ?

The warm blood vessels and cold blood vessels in penguin's feet are not weaved around each other.

....

....

2 (A) Put (✓) or (✗) : *(5 marks)*

1. The starred agama lizard blends in with big green trees in its environment to hide from its enemies. (   )
2. The sense of hearing of dolphins is stronger than that of human. (   )
3. Humans and most of animals depend on sight sense to see the surroundings. (   )
4. Speaking is the only way of communication between people. (   )

(B) Cross out the odd word :

1. Palm tree – Cactus plant – Mangrove tree – Barbary fig. (..................)
2. Brain – Spinal cord – Nerves – Lungs. (..................)

Part 1

3 **(A) Complete the following sentences :** *(5 marks)*

1. Huge eyes of owls and .... help them to gather more light for excellent night vision.
2. A group of fireflies can change their own .... to match the flashes of another group of fireflies to communicate.
3. All living organisms breathe in oxygen gas and gives out .... as a waste product.
4. Echolocation property is used by bats and .... to locate their preys.

(B) Give a reason for the following :

Gills are unique structural adaptation in fish.

....

....

4 **(A) Write the scientific term of each of the following :** *(5 marks)*

1. An animal that can sense the body heat of its preys at night, by using a special part on its head. (....................)
2. The visible form of energy, that enables us to see. (....................)
3. The season in which the humpback whale produces low-pitched sound. (....................)
4. A large muscle in the human body that contracts during breathing in and relaxes during breathing out. (....................)

(B) If you know that the color of desert jerboa is yellow like sand, as a structural adaptation :

How does this adaptation help jerboa to survive ?

....

....

....

....

Self-Assessments

on Concept (2.1)

Self-Assessment 23 On Lesson 1

1 **(A) Put (✓) or (✗) :**

1. The engine of a normal truck is the same engine of a rocket. (   )
2. Engineers use the same idea of rocket design in stopping the shockwave truck. (   )
3. You need energy to make a force to move a chair from one place to another. (   )

(B) Give a reason for the following :

Parachutes are used in the shockwave truck and rocket.

....

....

2 **(A) Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Normal engine 2. Jet engine 3. Parachute	a. is used in stopping both of the shockwave truck and rockets. b. is used in moving a normal truck. c. is used to stop a normal truck. d. is used in moving the shockwave truck.

1. ....   2. ....   3. ....

(B) Which is faster, a normal truck or the shockwave truck ? (Give a reason for your answer).

....

....

3 **This figure represents one of the most powerful and fastest trucks in the world :**

1. What is the name of this truck ?

....

2. What happens if the three jet engines of this truck are replaced by the engine of a normal truck ?

....

....

Part 1

Self-Assessment 24 till Lesson 2

1 (A) Choose the correct answer :

1. The force that acts on the table to stand on the ground is .... force.
   a. only pulling gravity
   b. only pushing gravity
   c. unbalanced pushing and pulling gravity
   d. balanced pushing and pulling gravity
2. The jet engines in the shockwave truck make it moves forward, due to the .... acting on it.
   a. pulling force only
   b. pushing force only
   c. both pulling and pushing forces
   d. the Earth's gravity force
3. We can see all the following motions except ....
   a. the rotation of Earth around the Sun.
   b. a person crossing the road.
   c. a person riding a bicycle.
   d. a person swimming in the sea.

(B) What happens if ... ?

The pulling force of one of the two teams in tug-of-war game becomes greater than the other team.

....

....

2 (A) Correct the underlined words :

1. We can stop the motion of the shockwave truck by using fire extinguishers. (....................)
2. In tug-of-war game, the winner team is the team with the weaker force. (....................)
3. You can stop the ball that is thrown towards you by the pulling force of your hands against the ball. (....................)

(B) Give a reason for the following :

In the opposite figure, by increasing the number of fire extinguishers, the distance that the cart moves will increase.

....

....

3 Look at the following figures, then choose the correct answer :



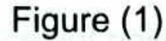


Figure (1)



Figure (2)

1. The force (s) used in figure (1) is/are ....
   a. pushing force only.
   b. pulling force only.
   c. both pushing and pulling forces.
   d. neither pushing nor pulling force.
2. The force(s) used in figure (2) is/are ....
   a. pushing force only.
   b. pulling force only.
   c. both pushing and pulling forces.
   d. neither pushing nor pulling force.
3. The winner group in the game of figure (2) is the group that has force .... that of the loser team.
   a. more than b. less than c. equal to d. weaker than

Self-Assessment 25 till Lesson 3

1 (A) Complete the following sentences :

1. There are two forces act on any object stands on a table which are .... and ....
2. You cannot lift up a bag from the ground if the pulling force of your hand and the force of gravity are ....
3. When you stop pedalling during the movement of the bicycle, its speed decreases gradually until it stops, due to the effect of .... force.

(B) Give a reason for the following :

When you let the ball out of your hand, it falls to the ground.

....

....

2 **(A) Put (✓) or (✗) :**

1. The shockwave truck has only one jet engine that makes it faster than the normal truck. ( )
2. The reason for stopping a toy car moves on a table is the friction between the toy car and the table surface. ( )
3. To move up any object from the ground, the pulling force of your hand must be smaller than the pulling force of the gravity. ( )

(B) Mention two forces act on a moving car and opposes its direction of movement.

....

....

3 **Look at the opposite figure that shows the movement of a ball pushed up with your hand, then answer the questions :**

(A) Put (✓) or (✗) :

1. The ball moves from point (1) to point (2) due to the hand pulling force. ( )
2. The ball moves from point (2) to point (3) due to the gravity pulling force. ( )
3. At all points, the ball is affected by the friction force of the air. ( )

(B) Complete the following sentence :

The ball moves from point .... to point .... in a direction opposite to the direction of gravity.

Self-Assessment 26 till Lesson 4

1 (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Friction force	a. are the forces that act on any object to make it moves.
2. Balanced forces	b. is the force that act in the opposite direction of the object's movement to stop it.
3. Unbalanced forces	c. is the force that act in the same direction of the object's movement to stop it.
	d. are the forces that act on any object that does not move.

1. .... 2. .... 3. ....

(B) Give a reason for the following :

If a ball moves on the ground, its speed decreases till it stops.

....

....

2 (A) Write the scientific term of each of the following :

1. The type of force that is used in tug-of-war game. (.......................)
2. It is the force that causes any object falls down toward the ground.(.......................)
3. It is the engine that is used in the shockwave truck to allow it moves fast. (.......................)

(B) What happens if ... ?

A car and a truck are affected by the same pushing force.

....

....

3 Look at this picture, then complete the following sentences :

1. The car moves as a result of .... force that is applied by the boy.
2. During the movement of the car, it is opposed by a friction force of .... and a friction force of ....
3. Friction force causes .... to the speed of the car.
4. If the car is pushed by a stronger force, it will move for a .... distance.
5. If this car is replaced by a bigger one, it will need a more .... force to move the same distance.

Self-Assessment 27 till Lesson 5

1 (A) Choose the correct answer :

1. When one of two toy cars moves faster than the other, this means that this toy car do work .... that of the other toy car.

   a. more than b. less than c. equal to d. half to

2. The reason for stopping a toy car craches the wall is the ....

   a. pushing force of wall in the opposite direction of the car movement.

   b. pushing force of wall in the same direction of the car movement.

   c. pulling force of wall in the opposite direction of the car movement.

   d. pulling force of wall in the same direction of the car movement.

3. In tug-of-war game, if the first group contains three children, while the second group contains nine children, this means that the forces act on the rope are .... of each other.

   a. balanced in opposite direction b. unbalanced in opposite direction

   c. balanced in the same direction d. unbalanced in the same direction

(B) Give a reason for the following :

Any body moves on the ground is usually affected by a force opposes its direction of movement.

....

....

2 (A) Correct the underlined words :

1. The reason for standing of a cup on a table is that the pushing force of the table is more than the pulling force of gravity. (......................)
2. The work done by the football is always less than the amount of energy transferred from the player foot to the ball. (......................)
3. If the same force is applied on a large ball and a small ball, the large ball moves a distance longer than the small ball. (......................)

(B) In the opposite figure, if we affect on these two toy cars by the same force :

Why the car (B) moves for a longer distance than the car (A) ?

....

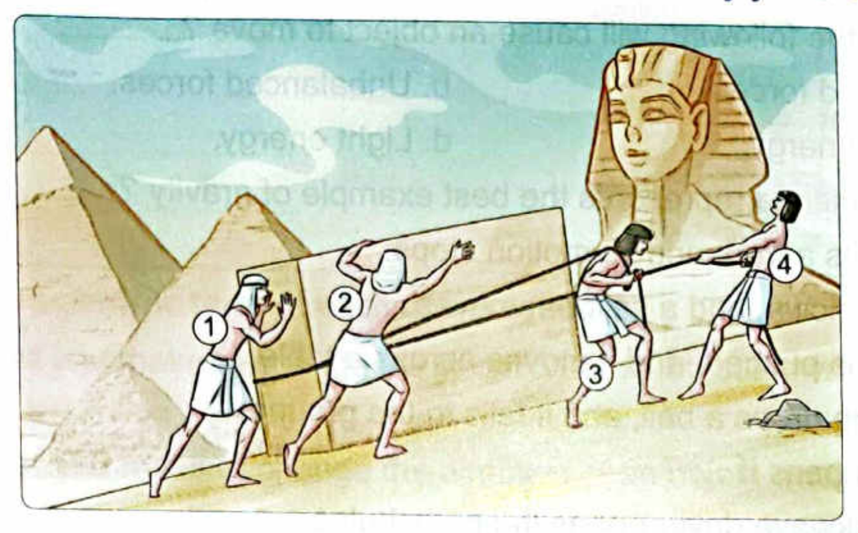
....

(A) 50 m

(B) 80 m

---

3 The pharaohs built the pyramids, and this work took many years of work :



(A) Find out from the picture :

1. Two persons pull the heavy stone. (......................)
2. Two persons push the heavy stone. (......................)
3. The type of force between the stone and the ground. (......................)

(B) Put (✓) or (X) :

1. If the large stone moves from its place, this means that there are balanced forces acting on it. (   )
2. Big stones need more force to move them than smaller ones. (   )
3. The work done is equal to the amount of energy transferred by a force that is used to move the stone. (   )

Model Exam
on Concept (2.1)

Total mark

___
20

1 (A) Choose the correct answer : *(5 marks)*

1. What force do you use to kick a ball with your leg ? ....
   a. Pull. b. Push. c. Sound. d. Light.
2. When an object is in motion, this means that its .... changes.
   a. color b. shape c. size d. position
3. Which of the following will cause an object to move ? ....
   a. Balanced forces. b. Unbalanced forces.
   c. Sound energy. d. Light energy.
4. Which sentence represents the best example of gravity ? ....
   a. A car hits a tree, and its motion stops.
   b. A wind blows, and a sailboat moves.
   c. A book is pushed, and it moves across a table.
   d. A person drops a ball, and it falls to the ground.

(B) What happens if ... ?

The shockwave driver opens the parachutes.

....

....

2 (A) Put (✓) or (✗) : *(5 marks)*

1. Lifting a book upward needs more energy than pushing a truck. ( )
2. You need energy to push a car forward or backward. ( )
3. Using a remote control of television needs a pushing force that acts on its buttons. ( )
4. When a car carshes into a wall, it will not stop. ( )

(B) Give a reason for the following :

The shockwave truck is faster than the normal truck.

....

....

3 (A) Complete the following sentences : *(5 marks)*

1. The work done by a basketball is equal to the amount of .... transferred from the player hand to the ball.
2. If the same pulling force acts on two boxes, and one of them is larger than the other, the smaller box will move for a .... distance.

3. When you lift up an object from the ground, there are two forces act on it, which are the .... force of your hand and .... force of the gravity.
4. We can say that the object is in motion relative to a .... point.

(B) The following figure shows two similar toy cars, study the figure then answer the questions below :

Which of these two cars is affected by a greater force ?

(Give a reason for your answer).

Original position

Ⓐ 70 cm

Ⓑ 35 cm

....

....

....

....

4 (A) Write the scientific term of each of the following : *(5 marks)*

1. A force that you make to change the direction of an object towards you. (........................)
2. A force that you make to change the direction of an object away from you. (........................)
3. It is a push or pull that is applied to an object causes it to change its position. (........................)
4. It is a force that is exerted when objects rub against each other. (........................)

(B) Look at the opposite figure, then answer the following question :

In the opposite figure what happens if we increase the number of fire extinguishers fixed on the cart.

....

....

....

Self-Assessments

on Concept (2.2)

Self-Assessment 28 on Lesson 1

1 (A) Choose the correct answer :

1. The roller coaster moves up the hill due to the effect of ....
   a. balanced force. b. sound energy.
   c. kinetic energy. d. gravity force.
2. When the roller coaster stops, its energy of motion ....
   a. doesn't change. b. increases.
   c. decreases. d. becomes zero.
3. The kinetic energy of a car increases by ....
   a. decreasing its speed.
   b. increasing its speed.
   c. keeping its speed without changing.
   d. decreasing the pushing force acts on it.

(B) What happens if ... ?

A roller coaster moves from up to down. (according to the change of energy).

....

2 (A) Put (✓) or (✗) :

1. Objects that don't move have no energy. ( )
2. As the roller coaster moves up a hill, it stores potential energy. ( )
3. When a moving object is affected by two equal opposite forces, it will stop. ( )

(B) Give a reason for the following :

A sand surfer moves very fast down the sand slope.

(according to the change of energy).

....

3 Look at the following figure, then complete the following sentences :

1. The bicycle stores energy when it moves from point .... to point ....
2. The speed of the bicycle increases when it moves from point .... to point ....
3. The .... energy of the bicycle will .... by increasing its speed.

Self-Assessment 29 till Lesson 2

1 **(A) Choose the correct answer :**

1. You do work in all the following situations <u>except</u> ....
   a. pushing a wooden box for a distance.
   b. throwing a stone for a distance.
   c. lifting a bag up for a distance.
   d. pulling a big tree which doesn't move.
2. A flying airplane in the sky has ....
   a. potential energy only.
   b. kinetic energy only.
   c. both potential and kinetic energies.
   d. neither kinetic nor potential energies.
3. You can see all following, <u>except</u> ....
   a. the light of the Sun. b. the reflected light of the moon.
   c. the light of the candle. d. the sound of a radio.

(B) Give a reason for the following :

When a tennis ball is thrown upwards, its potential energy increases.

....

2 **(A) Put (✓) or (✗) :**

1. Sound energy can be seen easily. (   )
2. Work is a force that causes an object to move a distance. (   )
3. No work is done if a force is applied but the object doesn't move. (   )

(B) What happens if ... ?

A ball falls from your hand towards the ground.(according to the change of energy).

....

3 **Look at the opposite figure, then choose the correct answer :**

1. Book number .... has the most potential energy.
   a. (1) b. (2)
   c. (3) d. (4)
2. Book number .... has the least potential energy.
   a. (1) b. (2)
   c. (3) d. (4)

3. Book number (2) has potential energy more than that of ....
   a. book number (3) only.
   b. book number (4) only.
   c. books number (1) and (3).
   d. books number (3) and (4).
4. Book number (3) has potential energy less than that of ....
   a. book number (4) only.
   b. book number (2) only.
   c. books number (1) and (2).
   d. books number (2) and (4).

Self-Assessment 30 till Lesson 3

1 **(A) Choose the correct answer :**

1. The stored energy in a battery placed inside a flashlight can be changed into .... energies.
   a. sound and light
   b. electrical and chemical
   c. light and thermal
   d. chemical and kinetic
2. A bird flying in the sky has ....
   a. potential energy only.
   b. kinetic energy only.
   c. both potential and kinetic energies.
   d. neither potential nor kinetic energies.
3. When a spring is compressed, it stores .... energy.
   a. chemical
   b. potential
   c. thermal
   d. light

(B) Give a reason for the following :

The stored potential energy in a battery differs from that of a ball at the top of a hill.

....

....

2 **(A) Put (✓) or (✗) :**

1. Some forms of energy can be created and also can be destroyed. ( )
2. There is only one form of energy, which is the potential energy. ( )
3. Batteries stores electrical energy. ( )

(B) What happens if ... ?

A ball is thrown upwards. (according to the change of energy).

....

3 **You have three devices (A) , (B) and (C) , if you know that :**

– Device (A) changes chemical energy into light and thermal energies.

– Device (B) changes electrical energy into kinetic energy.

– Device (C) changes chemical energy into thermal energy.

Choose correct answer :

1. Device (A) may be ....
   - a. a flashlight.
   - b. a television.
   - c. an electric heater.
   - d. a radio.
2. Device (B) may be ....
   - a. an electric heater.
   - b. an electric lamp.
   - c. an electric fan.
   - d. a radio.
3. Device (C) may be ....
   - a. a gas oven.
   - b. an electric fan.
   - c. an electric mixer.
   - d. a radio.

Self-Assessment (31) till Lesson 4

1 **Choose the correct answer :**

1. Both food and batteries, ...
   - a. store mechanical energy.
   - b. store chemical energy.
   - c. produce chemical energy.
   - d. produce light energy.
2. Both radio and television ....
   - a. are operated by gravitational energy.
   - b. are operated by mechanical energy.
   - c. produce sound energy.
   - d. produce chemical energy.
3. Electric heater produces .... energy.
   - a. electrical
   - b. sound
   - c. thermal
   - d. light

---

2 **(A) Put (✓) or (✗) :**

1. The energies produced from television are sound and light. ( )
2. There are some forms of energy, that can be destroyed. ( )

(B) You have four objects (A) , (B) , (C) and (D) , if you know that :

– Object (A) can't move but can produce sound.

– Object (B) is an apple.

– Object (C) produces light and thermal energies.

– Object (D) doesn't produce light energy.

Part 1

Choose correct answer :

1. Object (A) may be ....
   a. electric lamp. b. radio. c. food. d. flashlight.
2. Object (B) stores .... energy.
   a. mechanical b. thermal c. chemical d. light
3. Object (C) may be ....
   a. alarm bell. b. radio. c. food. d. the Sun.
4. Object (D) may be ....
   a. the Moon. b. the Sun. c. flashlight. d. electric lamp.

---

3 Look at the following figure, then choose the correct answer :

1. Wires inside the flashlight have .... energy.
   a. sound b. light
   c. electrical d. chemical
2. Which part inside the flashlight stores chemical energy ? ....
   a. Battery. b. Wires.
   c. Lamp. d. Its body.
3. Which form of energy in the flashlight you can see ? ....
   a. Electrical energy. b. Light energy.
   c. Thermal energy. d. Chemical energy.

Self-Assessment 32 till Lesson 5

1 Choose the correct answer :

1. When you stop on the ground without moving, so you have ....
   a. the most kinetic energy. b. no kinetic energy.
   c. the most potential energy. d. the least light energy.
2. All the following forms of energy do not affect the movement of a moving object, <u>except</u> ....
   a. sound energy. b. light energy.
   c. electric energy. d. kinetic energy.
3. The most potential energy stored in an object, is that when it is ....
   a. moving on the ground.
   b. at the top of a hill.
   c. standing without movement on the ground.
   d. at the bottom of a hill.

2 What happens if ... ?

A ball at 50 meters height from the ground starts to move down.

(according to the change of energy).

....

....

3 Look at the opposite figure, then choose the correct answer :

1. The ball number.................. has the most potential energy.

   a. 1 b. 2 c. 3 d. 4

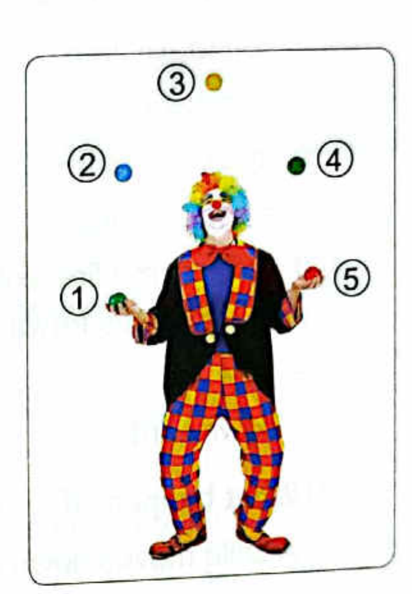
2. When the ball number ① moves up from its position to the position of ball ②, so its ....

   a. potential energy changes into kinetic energy.

   b. kinetic energy changes into potential energy.

   c. potential energy becomes zero.

   d. kinetic energy doesn't change.



3. When the ball number ③ moves down from its position to the position of ball ④, so its ....

   a. kinetic energy changes into potential energy.

   b. kinetic energy doesn't change.

   c. potential energy doesn't change.

   d. potential energy changes into kinetic energy.



Model Exam

on Concepts (2.1) & (2.2)

Total mark

20

(5 marks)

1 (A) Choose the correct answer :

1. All the following objects are affected by unbalanced forces, except ....
   a. a person sitting on a chair.
   b. a ball moves on the ground.
   c. a plane flying in the sky.
   d. a person jumps up in the air.

2. When we turn on a television, ... and .... energies are produced.
   a. sound – chemical
   b. light – chemical
   c. sound – light
   d. solar – light

3. By increasing .... and ...., the potential energy increases.
   a. mass – weight
   b. mass – height
   c. mass – speed
   d. height – speed

4. If we fix some fire extinguishers onto a cart, the air that moves .... makes the cart moves forward.
   a. forward
   b. upward
   c. downward
   d. backward

(B) What happens if ... ?

A child moves down along the slide (concerning the change of energy).

....

(5 marks)

2 (A) Put (✓) or (✗) :

1. Sound waves is a form of potential energy. ( )
2. We can say that a body is in motion if its position changes relative to a moving point. ( )
3. Food provides our bodies with energy. ( )
4. Their is a work done, When you write on the keyboard of a computer. ( )

(B) Give a reason for the following :

We can't live without eating food.

....

3 **(A) Complete the following sentences using the words below :** *(5 marks)*

(long – potential – gravity – work)

1. When a ball is pushed up in the air, the ball stores .... energy.
2. If a pushing force is applied on a chair to move it, so a .... is done.
3. The water in waterfall falls down into the lake due to the effect of ....
4. When you kick a ball on the ground hardly it will travel a .... distance.

(B) Look at the opposite figure, then answer the following questions :

1. What is the name of this truck ?

....

2. What happens if this truck is not provided with parachutes ?

....

4 **(A) Write the scientific term of each of the following :** *(5 marks)*

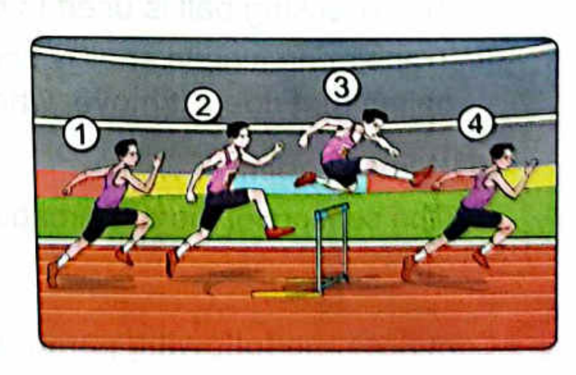
1. A fastest truck in the world, which is operated by the help of three jet engines. (........................)
2. It is the force that is found between a tire of a moving bicycle and the road. (........................)
3. A form of energy that increases by increasing the speed of an object. (........................)
4. An energy that is produced from a radio. (........................)

(B) Look at the opposite figure, then choose the correct answer :

The runner has the most potential energy in position number ....

a. 1 b. 2

c. 3 d. 4



Self-Assessments

on Concept (2.3)

Self-Assessment 33 on Lesson 1

1 **(A) Choose the correct answer :**

1. When a fast car hits a very big stone that doesn't move, all the following situations may happen except ....
   a. the speed of the car becomes zero and it will stop.
   b. the energy of the car transfers to the stone.
   c. the airbags are inflated and filled with a gas.
   d. the car keeps moving and its speed increases.
2. The safety equipment that have an important role during collisions between cars includes ....
   a. airbags only.
   b. seatbelts only.
   c. airbags and seatbelts.
   d. car tires and steering wheel.
3. During collision, all the following situations may occur to the speed of the crashed cars, except it will ....
   a. increase.
   b. decrease.
   c. become zero.
   d. remain as it is.

(B) Give a reason for the following :

After collision, the airbags deflate through their holes as fast as they inflate.

....

....

2 **(A) Put (✓) or (✗) :**

1. Hitting a cricket ball with the bat causes a change in its speed and its direction. ( )
2. The wrecking ball is used to destruct walls of buildings. ( )
3. Transfering kinetic energy occurs only from moving object to an object that doesn't move, when they collide together. ( )

(B) What happens if ... ?

The sensors of the car airbags feel a strong crash with the car's body.

....

3 **Complete the following paragraph using the words below :**

(different – kinetic – car – bicycle)

When a moving car collides with a bicycle, the car transfers its .... energy to the bicycle, so the bicycle moves in a .... direction and the .... has been more damaged than the ....

Self-Assessment 34 till Lesson 2

1 (A) Choose the correct answer :

1. All the following things are used to move cars, except ....
   a. gasoline. b. food. c. electricity. d. solar energy.
2. If a car carries a heavy mass, the driver must move .... to avoid damages of collisions.
   a. with a slow speed
   b. with a high speed
   c. with a low potential energy
   d. with a high potential energy
3. When a fast moving truck collide with a slow moving small car, some of the kinetic energy of the truck ....
   a. is transformed into light energy.
   b. is transformed into solar and chemical energies.
   c. is transferred as kinetic energy to the small car.
   d. is destroyed and no longer be existed.

(B) Calculate the speed of a moving car, if you know that it covers a distance of 240 kilometers in 4 hours.

....

2 (A) Put (✓) or (✗) :

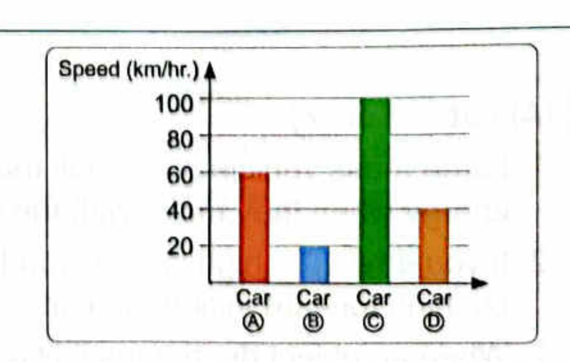
1. When the kinetic energy of a moving body increases, its speed decreases. (   )
2. The only form of energy that cannot be stored is the thermal energy. (   )
3. If a collision happens between two light and slow objects that move in the same direction, a small amount of damage is occurred. (   )

(B) What happens if ... ?

The speed of a moving object increases. (according to its kinetic energy).

....

3 Look at the opposite graph, then choose the correct answer :



1. Which car has the most kinetic energy ? ....
   a. A b. B
   c. C d. D

2. Car (D) has kinetic energy more than car ....
   a. A b. B c. C d. D
3. If a collision occurs between car .... and a wall , it will cause the most damage.
   a. A b. B c. C d. D
4. If a collision occurs between car .... and a wall, it will cause the least damage.
   a. A b. B c. C d. D

Self-Assessment 35 till Lesson 3

1 (A) Choose the correct answer :

1. If there is a collision between two large masses objects at high speeds, and another collision between two small masses objects at low speeds, so ....
   a. both collisions don't cause any damage.
   b. both collisions cause the same amount of damage.
   c. the first collision causes more damage than the second collision.
   d. the first collision causes less damage than the second collision.
2. The energy produced from the burning fuel in an engine, ...
   a. is converted into chemical potential energy.
   b. doesn't convert into any other form of energy.
   c. is converted into kinetic energy.
   d. is converted into gravitational potential energy.
3. If a moving car makes a collision, which of the following speeds causes the lowest amount of damage to that car ? ....
   a. 60 km/hr. b. 75 km/hr. c. 80 km/hr. d. 50 km/hr.

(B) Give a reason for the following :

If two vehicles moves at the same speed, the vehicle with a large mass causes more damage than the vehicle with a small mass during collision.

....

....

2 (A) Put (✓) or (✗) :

1. Large mass vehicle and small mass vehicle, have the same kinetic energy when they move with the same speed. ( )
2. If you drive at a high speed, you have to stop gradually to avoid pushing forward inside the car. ( )
3. When an object decreases its speed gradually, so its kinetic energy decreases gradually. ( )

(B) What happens if ... ?

The mass of a moving object increases. (according to its kinetic energy).

....

3 Look at the opposite photos, then choose the correct answer :



Train speed = 90 km/hr.



Truck speed = 90 km/hr.

1. Kinetic energy of the train is .... that of the truck.
   a. less than b. more than c. equal to d. half to
2. During collision, the train causes more damage than the truck as it has .... the truck.
   a. more mass than b. less mass than
   c. equal mass as d. half the mass of
3. All the following sentences are correct except ....
   a. the train has the most mass.
   b. the train and the truck have the same speed.
   c. the truck has the most mass.
   d. the truck has the least kinetic energy.

Self-Assessment 36 till Lesson 4

1 (A) Choose the correct answer :

1. A wooden box that doesn't move, gains the largest amount of kinetic energy when a moving car with a speed equals .... hits this box.
   a. 30 km/hr. b. 50 km/hr. c. 80 km/hr. d. 120 km/hr.
2. As the angle of the ramp increases, the kinetic energy of an object moving downward this ramp will ....
   a. increase. b. decrease.
   c. remain as it is. d. change into light energy.
3. The kinetic energy of a moving car down a ramp is affected by ....
   a. the mass of the car only.
   b. the angle of the ramp only.
   c. both the mass of the car and the angle of the ramp.
   d. both the mass and color of the car.

(B) Give a reason for the following :

The kinetic energy of an object that moves down a ramp increases by increasing the angle of the ramp.

....

....

2 (A) Put (✓) or (✗) :

1. Objects of the same masses that moves with different speeds, have the same amount of kinetic energy. ( )
2. As the angle of inclination of a ramp increases, the kinetic energy of an object moves on it upward decreases. ( )
3. When a vehicle with a high amount of kinetic energy collide with a standing person, the vehicle pushes the person for a long distance. ( )

(B) What happens if ... ?

Increasing the mass of an object that moves down a ramp.

(according to the kinetic energy of the object).

....

3 If there are two toy cars (A) and (B) with different masses and move down on the same ramp with length 6 meters.

Choose the correct answer :

1. Car (A) travels the ramp in 3 seconds, so its speed = ...
   a. 2 km/hr. b. 2 m/sec. c. 6 km/hr. d. 3 m/sec.
2. Car (B) travels the same distance in 6 seconds, so its speed = ...
   a. 1 km/hr. b. 3 m/sec. c. 6 km/hr. d. 1 m/sec.
3. From the previous results, you can find out that ....
   a. the speed of car (A) is more than that of car (B).
   b. the speed of car (A) is less than that of car (B).
   c. both cars have the same speed.
   d. the speed of both cars is equal to zero.
4. In your openion, which of the following sentences may be correct ? ....
   a. Mass of car (A) = 40 grams, mass of car (B) = 80 grams.
   b. Mass of car (A) = 80 grams, mass of car (B) = 40 grams.
   c. Mass of car (A) = mass of car (B) = 40 grams.
   d. Mass of car (A) = mass of car (B) = 80 grams.

Self-Assessment 37 till Lesson 5

1 (A) Choose the correct answer :

1. After collision, the distance that the last ball move on the other side of the Newton's cradle, depends on ....
   a. the stored sound energy in it.
   b. the stored kinetic energy in it.
   c. the kinetic energy that is transferred from the previous balls.
   d. the electrical energy that is transferred from the previous balls.
2. Collision of two moving cars at high speeds and move in opposite directions, is .... that when they are in the same direction.
   a. not dangerous as
   b. equal in danger as
   c. less dangerous than
   d. more dangerous than
3. .... are two forms of energy that exist in the Newton's cradle during collisions.
   a. Kinetic energy and chemical energy
   b. Potential energy and light energy
   c. Kinetic energy and potential energy
   d. Chemical energy and light energy

(B) Give a reason for the following :

A sound can be heard during the collision between the Newton's cradle balls.

....

2 (A) Put (✓) or (X) :

1. When you raise up a ball in the Newton's cradle, it stores thermal energy. ( )
2. In Newton's cradle **as the height of the raised ball increases, it stores more potential energy.** ( )
3. In Newton's cradle as the amount of the kinetic energy increases, the moving distance of the balls increases. ( )

(B) What happens if ... ?

You leave the moving balls of the Newton's cradle move for a long time. (according to their energy).

....

3 Look at the opposite figure, then choose the correct answer :

1. When the Newton's cradle ball is raised up without leaving it go, its .... energy is maximum and its .... energy equals zero.

   a. kinetic – potential b. potential – kinetic

   c. kinetic – sound d. kinetic – thermal

2. When you leave the ball moves in the direction of the rest of balls some of kinetic energy of this ball changes into .... and .... energies.

   a. sound – electrical b. thermal – kinetic

   c. kinetic – sound d. sound – thermal

Model Exam
on Theme (2)

Total mark

—
20

1 (A) Choose the correct answer : *(5 marks)*

1. When you move something toward you, this represents ....
   a. pushing force. b. light energy.
   c. pulling force. d. sound energy.

2. The roller coaster has the most energy of motion, ...
   a. when it goes up to the top of the hill.
   b. when it goes down the hill.
   c. when it stops at the top of the hill.
   d. when it stops at the bottom of the hill.

3. Which of the following sentences describes the friction force ? ....
   a. It pulls objects toward the ground.
   b. It pushes objects away from the ground.
   c. It doesn't affect objects in motion.
   d. It slows down or stops objects in motion.

4. The object that has the most kinetic energy, is .... object.
   a. the fastest and lightest b. the slowest and lightest
   c. the fastest and heaviest d. the slowest and heaviest

(B) Give reasons for :

1. The shockwave truck is faster than the normal truck.

....

....

2. A roller coaster doesn't need electricity during its movement down the hill.

....

....

2 (A) Put (✓) or (✗) : *(5 marks)*

1. If two objects travel for equal amount of time, the object that travels a longer distance has a slower speed. ( )
2. When a cricket bat hits the ball, its potential energy transfers to the ball. ( )
3. The main difference between pulling and pushing forces is the direction of the force. ( )
4. You can change kinetic energy into stored potential energy, when you compress a toy spring. ( )

(B) What happens if ... ?

The airbags in a car don't inflate during a crash.

....

....

3 (A) Write the scientific term of each of the following : *(5 marks)*

1. A force that you make to change the direction of an object away from you. (..........................)
2. The form of energy that increases when the speed of an object increases. (..........................)
3. The distance covered by a moving object in a certain time. (..........................)
4. Safety equipment used to prevent car passengers from moving forward, when the car stops suddenly. (..........................)

(B) Cross out the odd word :

Electrical energy – Chemical energy – Thermal energy – Light energy.

(..........................)

4 (A) Complete the following sentences : *(5 marks)*

1. When you kick the ball that standing on land, it starts to move, because it gets .... energy.
2. If the speed of an object decreases this means that its kinetic energy ....
3. When moving objects collide with each other, ... is transferred between them.
4. Food and batteries store .... energy.

(B) A train travels a distance of 240 kilometers in 3 hours, find its speed.

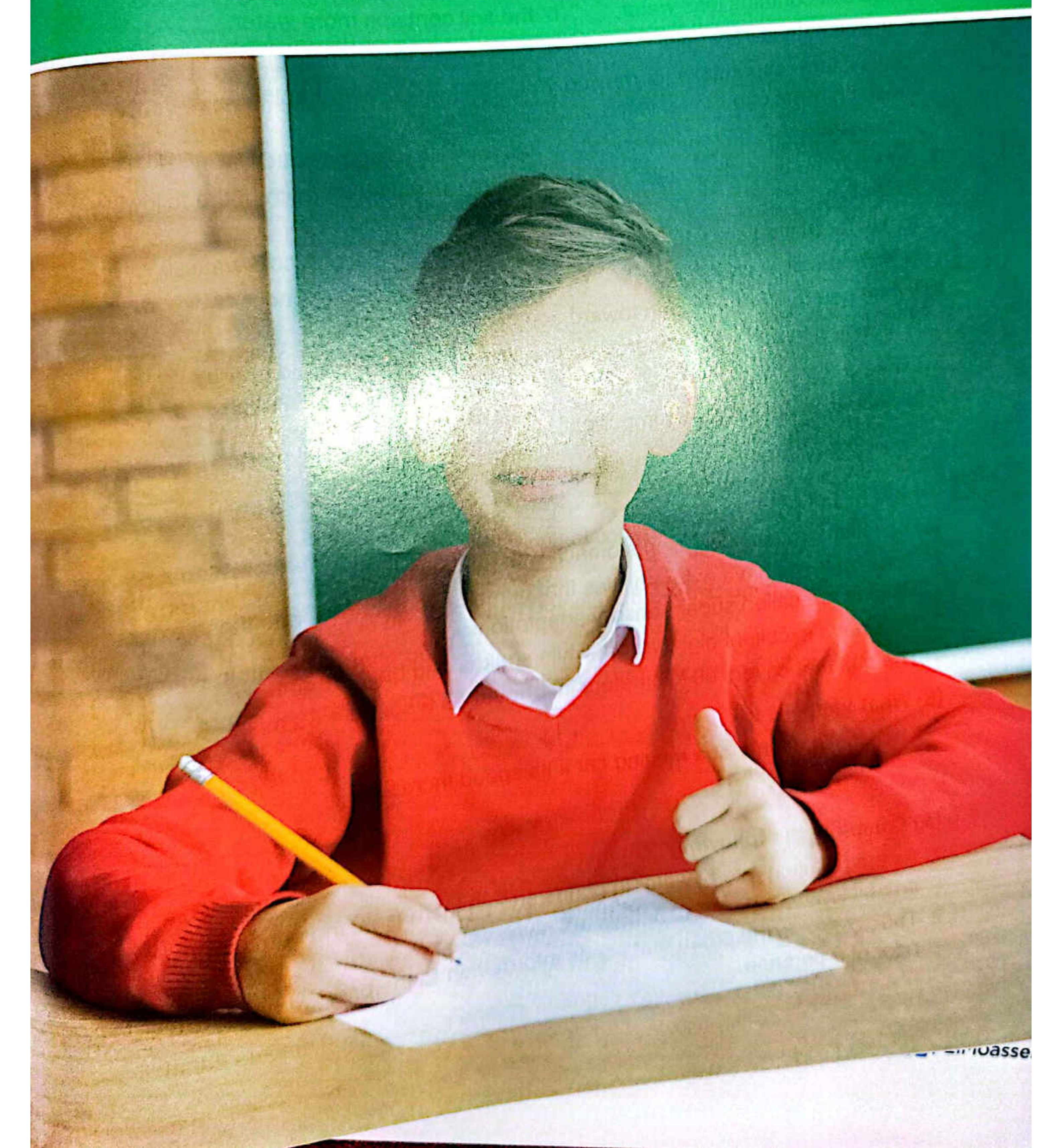
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PART 2

Final Examinations :

- El-Moasser Final Examination Models.
- Final Examinations of some Governorates.



El-Moasser Final Examinations

Model Exam 1

1 (A) Choose the correct answer :

1. The roots of kapok tree don't grow deeply in the soil, because ....
   a. the soil contains less water. b. the soil contains more water.
   c. the climate is very cold. d. the climate is very hot.
2. The system responsible for moving your hand away from danger, such as touching a hot cup of tea, is the .... system.
   a. digestive b. respiratory c. nervous d. stomach
3. Songs of humpback whales in winter are characterized by each of the following <u>except</u> ....
   a. it is for mating season. b. moving better through cold water.
   c. having soft sounds. d. having low-pitched sounds.
4. When you move something toward you, this represents ....
   a. pushing force. b. light energy. c. pulling force. d. sound energy.

(B) Give a reason for the following :

Seatbelts in cars are very important.

....

....

2 (A) Put (✓) or (✗) :

1. Digestion process begins in stomach with the help of saliva. ( )
2. Some animals have extra abilities that humans do not have, and these extra abilities are called super sensory adaptations. ( )
3. Cats have excellent night vision, while snakes and bats are not. ( )
4. The bus that covers 60 kilometers in 1 hour has a speed = 60 m/sec. ( )

(B) What happens to ... ?

The kinetic energy of a moving car if its speed increases.

....

....

3 (A) Complete the following sentences :

1. As the pollution rate of water in ponds and air increases, the number of amphibians ....
2. The .... is the organ that sends information to the brain when you smell the odor of a perfume.

3. To increase the speed of a moving car, we need to .... the force that acts on it.
4. When a moving car hits a tree, a part of .... energy of the car changes into a .... energy that you can hear.

(B) Classify the following actions in the table below according to the needed force :

1. Typing on a keyboard.
2. Lifting a bag.
3. Moving a chair away from you.
4. Kicking a football.
5. Closing the door from inside a room.
6. Opening the door of a refregirator.

Pulling force	Pushing force
....	....
....	....
....	....
....	....
....	....

4 (A) Write the scientific term of each of the following :

1. The part of the kapok tree which is supported by the buttress roots. (..........................)
2. It delivers messages between the spinal cord and different body organs. (..........................)
3. It is the force that is exerted when objects rub against each other. (..........................)
4. One of the measuring units of time. (..........................)

(B) Find the speed of a runner, if you know that he covers 300 meters in 30 seconds.

....

....

Model Exam 2

1 (A) Complete the following sentences :

1. Engineers use .... to slow down the motion of the shockwave truck.
2. The speed affects the .... energy of a moving object.
3. In the electric bell, ... energy changes into .... energy.

4. Most animals can hunt when .... energy bounces off a prey into their eyes, while bats can hunt when .... energy bounces off a prey into their ears.

(B) Give a reason for the following :

When your friend catches a ball that is thrown in the air, the movement of the ball is stopped.

....

....

2 (A) Choose the correct answer :

1. Displaying light is a type of communication that is found in ....
   a. plants only. b. plants and humans.
   c. animals and humans. d. animals only.
2. The speed of a toy car moves down a ramp increases by increasing its ...., but its speed decreases by increasing the ....
   a. friction force – mass. b. mass – friction force.
   c. temperature – mass. d. mass – temperature.
3. Human can help restoring ecosystem by all of the following activities, except ....
   a. replanting the cleared forests. b. removing air and water pollutants.
   c. producing more factories exhausts.
   d. preserving existed plants and animals.
4. When a car moves up a hill, this happens due to the effect of ....
   a. gravity force. b. balanced force. c. sound energy. d. kinetic energy.

(B) What happens if ... ?

Light falls on a mirror that has few cracks.

....

....

3 (A) Correct the underlined words :

1. Both factories exhausts and floods produce smog, that causes air pollution. (........................)
2. The energy that is produced due to the friction between the string and other parts of Newton's cradle, is the sound energy. (........................)
3. Hearing is one of the weak senses of jerboa. (........................)

4. The friction between the car's windows and the road decreases the speed of the car. (..........................)

(B) Classify the following materials into opaque objects and transparent objects :

"Wood – Air – Water – Metal – Lenses"

Opaque objects	Transparent objects
....	....
....	....
....	....
....	....

4 (A) Write the scientific term of each of the following :

1. A group of ants which is responsible for sending smelly messages when there is a shortage of food. (..........................)
2. It is the force that pulls objects toward the center of the Earth. (..........................)
3. A structural adaptation that prevents the loss of water in the pine tree. (..........................)
4. The organ used to differentiate between different scents. (..........................)

(B) A truck travels a distance of 160 kilometers in 2 hours. Find its speed.

....

....

Model Exam 3

1 (A) Choose the correct answer :

1. Which of the following sentences describes the friction force ? ....
   a. It pulls objects toward the ground.
   b. It pushes objects away from the ground.
   c. It slows down or stops the moving objects.
   d. It doesn't affect the moving objects.
2. In penguin's body, the insulating layer of fat and dense feathers trap .... against the skin.
   a. cold air b. cold water c. warm water d. warm air

3. The energy that is stored in an object due to its position, is known as ....
   a. kinetic energy. b. potential energy.
   c. electrical energy. d. chemical energy.

4. When you see a car coming towards you, the sensory receptors .... to get away from it.
   a. in the ears send a signal to the brain first
   b. in the eyes send a signal to the brain first
   c. in the eyes send a signal to sensory receptors in the ears
   d. in the ears send a signal to sensory receptors in the eyes

(B) Give a reason for the following :

Mirror can reflect the light better than a painted surface.

....

2 (A) Put (✓) or (✗) :

1. The kinetic energy of a toy car pushed on a flat surface is equal to the kinetic energy of another toy car pushed with the same force down a ramp. (   )
2. The main difference between pulling and pushing forces is the direction of the force. (   )
3. Sharp spines are adaptation of different plants to prevent animals from eating them. (   )
4. As the height of an object from the Earth's surface increases, its potential energy increases. (   )

(B) Find the speed of a car that moves a distance of 240 Kilometers in 3 hours.

....

....

3 (A) Write the scientific term of each of the following :

1. They include the eyes, nose, ears, tongue and skin, and they receive information from the surroundings and send it to the brain. (........................)
2. They are present in car airbags, and allow them to deflate fast after collision. (........................)
3. A type of surface that reflects light in different directions when the light falls on it. (........................)
4. A large muscle that contracts during breathing in and relaxes during breathing out. (........................)

(B) Classify the following living organisms according to their habitats into organisms live in deserts and organisms live in forests in the table below :

(Starred agama lizard – Panther chameleon – Fennec fox – Kapok tree – Palm tree – Barbary fig plant).

Organisms live in deserts	Organisms live in forests
....	....
....	....
....	....

4 (A) Complete the following sentences :

1. During swallowing, the food passes from the throat to the .... then to the .... inside your digestive system.
2. During inhalation, air travels down from your throat to your lungs through ....

(B) Compare between :

Points of comparison	Inhalation	Exhalation
1. Diaphragm movement :	....	....
2. Size of chest cavity :	....	....
3. The air is rich in :	.... **gas.**	.... **gas.**

Model Exam 4

1 (A) Write the scientific term of each of the following :

1. A property that helps animals blend in with their surrounding environment. (........................)
2. A system that works inside the human body such that it keeps the human away from danger. (........................)
3. The energy that is used to operate television. (........................)
4. The force that makes an object moves a distance. (........................)

(B) Give one example for the following :

One of the sources of light which gives out its own light. (........................)

2 **(A) Choose the correct answer :**

1. The potential energy of an object, depends on ....
   a. its mass only.
   b. its height from the Earth's surface only.
   c. its mass and its height from the Earth's surface.
   d. its temperature.
2. .... is considered as a behavioral adaptation in the panther chameleon.
   a. Puffing up its body during danger
   b. Each eye can move independently
   c. V-shaped feet
   d. Long sticky tongue
3. From the structural adaptation of water lily plant is that ....
   a. it has long roots.
   b. it has sharp spines.
   c. it has tiny leaves.
   d. it has wide leaves.
4. All of the following are examples of motion except ....
   a. a running person.
   b. a ball travelling through the air.
   c. a flying bird.
   d. a sleeping dog.

(B) What happens if ... ?

Humans stop throwing waste materials to waterways and soil in an ecosystem.

....

....

3 **(A) Correct the underlined words :**

1. The <u>balanced</u> forces cause the object to move. (..........................)
2. When you turn on a radio, the electrical energy changes into <u>light</u> energy. (..........................)
3. <u>Potential energy</u> depends on the speed of an object. (..........................)
4. The system that works with the eyes of living organisms for seeing objects is the <u>digestive system</u>. (..........................)

(B) A deer runs a distance of 200 meters in 5 seconds. Calculate its speed.

....

....

4 **(A) Complete the following sentences :**

1. On hearing an alarm ring, the sensory receptors that are found in the .... send a message through a network of nerves to the .... which determines what to do to avoid danger.
2. Ants use their sense of .... to communicate with each other, while bees use .... by doing a special dances to communicate with each other.
3. If the kinetic energy of a moving body decreases, its speed will ....

(B) Compare between :

Points of comparison	Polar bear	Forest bear
1. Habitat :	....	....
2. Fur color :	....	....

Model Exam 5

1 (A) Choose the correct answer :

1. When a car suddenly stops, the passengers move ....
   a. backward. b. forward. c. upward. d. downward.
2. Reading and writing are common types of communication in .... world.
   a. humans b. animals c. birds d. plants
3. Bears that live in forests have fur .... that of polar bears.
   a. whiter than b. darker than
   c. similar to d. brighter than
4. When the roller coaster stops, its energy of motion ....
   a. doesn't change. b. increases.
   c. decreases. d. becomes zero.

(B) What happens if ... ?

The length of acacia taproot doesn't exceed 3 meters downward.

....

....

2 (A) Put (✓) or (✗) :

1. At night, cats eyes look like small lighted lamps. ( )
2. The sandy-colored fur of caracal helps it blend in with snow in polar environment. ( )
3. After car collision, the airbags deflate as fast as they inflate. ( )
4. The stopped object can't move until a force acts on it. ( )

(B) Look at the following pictures, then choose if the forces are "balanced" or "unbalanced" :



1. A book on a table
(Balanced – Unbalanced)



2. A seesaw
(Balanced – Unbalanced)

3 **(A) Write the scientific term of each of the following :**

1. A type of foxes that has sandy-colored fur to adapt its desert environment. (.........................)
2. It is the force that pulls objects toward the center of Earth. (.........................)
3. Safety equipment used to provide soft cushion, when it is inflated automatically with a gas during collision of cars. (.........................)
4. A plant lives in salt water habitat and has long, strong roots to resist the water waves. (.........................)

(B) Give a reason for the following :

Branches of acacia tree are gather on the top of its trunk.

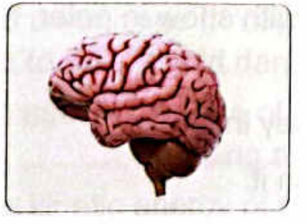
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4 **(A) Correct the underlined word :**

1. <u>Keeping</u> the position of an object relative to a fixed point represents motion. (.........................)
2. Moving an object towards you represents a <u>pushing</u> force. (.........................)
3. <u>Seatbelts</u> absorb the energy of the car due to its collision and gets inflated. (.........................)
4. Under the effect of <u>pushing force</u> of gravity, anything falls down to the ground. (.........................)

(B) Look at the following figures, then complete the following sentences :



Part (1)



Part (2)



Part (3)

1. These body parts belong to the .... system.
2. When you touch a freezing bottle of water, part number .... in your hand sends a message through part number .... to reach part number .... telling you that this bottle is very cold.

Model Exam 6

1 (A) Choose the correct answer :

1. All the following properties are considered as structural adaptations in the panther chameleon, <u>except</u> ....
   a. each eye can move independently.
   b. openning its mouth wide at danger.
   c. V-shaped feet.
   d. long sticky tongue.
2. When an object is in motion, this means that its .... changes.
   a. color b. shape c. size d. position
3. Pine tree has a triangular shape to make snow slides over its branches without breaking it. This structural adaptation makes this tree face the extreme cold climate like the feet of ....
   a. caracal. b. penguin. c. fennec fox. d. brown bear.
4. If there is nothing to stop the movement of an object, this object will ....
   a. stay in motion.
   b. suddenly stop.
   c. stop after few minutes.
   d. stop after few seconds.

(B) Give a reason for the following :

Some animals have the ability to make camouflage adaptation.

....

2 (A) Put (✓) or (✗) :

1. Unbalanced forces keep an object in its place without moving. ( )
2. The moving objects only have energy, while the objects that don't move have no energy. ( )
3. In penguin's feet, the cold blood vessels can warm up the warm blood vessels. ( )
4. The Moon is not considered as a light source. ( )

(B) Classify the following animals in the table below :

(Fishing cat – Dolphin – Tarsier – Bat)

Animals have super sight sense	Animals have super hearing sense
....	....
....	....

3 **(A) Write the scientific term of each of the following :**

1. An organ in the human digestive system that has tiny blood vessels to absorb the nutrients through its walls. (..........................)
2. A feature in the bull shark, in which the upper surface of its body is darker than its lower surface. (..........................)
3. The ability to do work or cause a change. (..........................)
4. The organ used to differentiate between the taste of different types of food. (..........................)

(B) Amir rides his bike and covers a distance of 150 meters in 5 seconds. Calculate the speed of the bike.

....

....

---

4 **(A) Correct the underlined words :**

1. Two objects have the same mass and stopped at the same height, have the same <u>kinetic energy</u>. (..........................)
2. A car battery stores a form of <u>kinetic energy</u> known as chemical energy. (..........................)
3. As the object moves faster, its <u>potential energy</u> increases. (..........................)
4. During hitting a ball the cricket bat transfers its <u>light energy</u> to the ball. (..........................)

(B) Look at the following figures that represent the respiration process, then answer the questions :

1. Which figure represents inhalation. (..............)
2. Which figure represents exhalation. (..............)
3. In figure (a) .... muscle contracts and the size of chest ....
4. The air that comes out in figure (b) is rich in .... gas.

Figure (a) Figure (b)

Model Exam 7

1 (A) Choose the correct answer :

1. Camouflage means that the animal ....
   a. can be seen easily among its surrounding.
   b. is hard to be seen among its surrounding.
   c. is easily to be seen by its preys.
   d. can be seen easily by its predators.
2. The five senses of humans and animals include ....
   a. sight, hearing, touch, smell, and movement.
   b. sight, movement, taste, touch, and smell.
   c. taste, touch, movement, hearing, and smell.
   d. sight, hearing, taste, smell, and touch.
3. When an object moves down a ramp, its stored energy ....
   a. increases.
   b. doesn't change.
   c. changes to a less active form of energy.
   d. changes to a more active form of energy.
4. The structural adaptation that helps the fishing cat to catch a prey at night, is that ....
   a. it can feel the heat of prey's body.
   b. it can hide inside the forest.
   c. it can digest its prey easily.
   d. it has excellent night vision.

(B) What happens if ... ?

Friction occurs between the string and the other parts of Newton's cradle during collision. (according to the change of energy)

....

2 (A) Complete the following sentences :

1. Among animals that can live in polar environment are .... and ....
2. Television operates by .... energy and it produces .... and .... energies.
3. When objects collide with each other, ... is transferred between them.
4. Echolocation is a type of communication that depends on the sense of ...., and it used by some animals such as .... and ....



Part 2

(B) Choose from column (A) what suits it in both columns (B) and (C) :

(A) Living organisms	(B) Species	(C) Habitats
1. Bull shark :	a. reptile	A. savannah
2. Starred agama :	b. amphibian	B. salt and fresh water
3. Acacia :	c. fish	C. wet environment
4. Frog :	d. plant	D. desert environment

1. .... ⟶ .... 2. .... ⟶ .... 3. .... ⟶ .... 4. .... ⟶ ....

3 (A) Put (✓) or (✗) :

1. Exposing to air rich in dust for a long time harms the human respiratory system. ( )
2. If two objects travel for equal period of time, the object that travels a greater distance have a slower speed. ( )
3. When an object moves faster, it gains larger amount of kinetic energy. ( )
4. Camouflage helps animals adapt the extreme weather conditions in their ecosystems. ( )

(B) Find the speed of a horse, if you know that it covers 250 meters in 5 seconds.

....

4 (A) Write the scientific term of each of the following :

1. A process through which the body gets oxygen from the air and expels out carbon dioxide. (........................)
2. An animal that has multiple bright colors to provide camouflage in its environment and has V-shaped feet. (........................)
3. The liquid that stores chemical energy, and it is used to move cars. (........................)
4. The energy that is stored in food and batteries. (........................)

(B) Give a reason for the following :

It is very dangerous to live in an ecosystem that has a high level of air pollution.

....

....

Model Exam 8

1 **(A) Put (✓) or (X) :**

1. A moving object is not affected by friction force. ( )
2. Some animals prefer hunting during the night than hunting during the day. ( )
3. The object that travels down a ramp is affected by the force of gravity. ( )
4. Eyes are one of the five senses, on which humans and animals depend on to see the surroundings. ( )

(B) Give a reason for the following :

The measuring unit of speed is km/hr or m/sec.

....

....

2 **(A) Choose the correct answer :**

1. If the angle of inclination of a ramp increases, the kinetic energy of an object moving down it will ....
   a. decrease. b. increase. c. remain as it is. d. be destroyed.
2. In Morse code, long flashes can be used to represent ....
   a. dots only. b. dashes only.
   c. both dots and dashes. d. neither dots nor dashes.
3. Umbrella-shaped trees include ....
   a. mangrove tree and acacia tree. b. mangrove tree and kapok tree.
   c. acacia tree and kapok tree. d. barbary fig and water lilies.
4. Fennec foxes and arctic foxes live in burrows, this belongs to .... adaptation.
   a. only structural b. only behavioral
   c. both structural and behavioral d. neither structural nor behavioral

(B) A train travels from Cairo to Alexandria for a distance of 220 kilometers in 2 hours. Find its speed.

....

....

3 **(A) Correct the underlined words :**

1. As the mass of a car increases, the damage that occurs during its collision decreases. (........................)
2. Air enters the mouth of fish and then passes across its gills. (........................)

3. The sense of eyesight of owls is weaker than that in bats. (..........................)
4. Groups of ants within a colony have similar roles. (..........................)

(B) What happens if ... ?

The amount of food in the ant's colony decreases.

....

....

4 (A) Cross out the odd word :

1. The Sun – The Moon – Fire – Candle. (..........................)
2. Bats – Fireflies – Blind person's cane – Dolphins. (..........................)
3. Fennec fox – Starred agama lizard – Panther chameleon – Bull shark. (..........................)
4. Guitar – Flashlight – Radio – Alarm bell. (..........................)

(B) Look at the opposite figure, then complete the following sentences :

1. The person in this figure use .... to land safely.
2. The idea of person landing in this figure is the same idea of stopping the motion of ....

Model Exam 9

1 (A) Complete the following sentences :

1. The bee dances in a figure-eight pattern while vibrating its .... , and the other bees read the .... of the dancer and then fly off to the specific location.
2. When two cars move on the same road, car (A) moves at speed equals 10 m/sec., and car (B) moves at speed equals 20 m/sec., this means that car .... moves longer distance than car .... in the same time.
3. Humans, amphibians and reptiles have .... to breath oxygen gas in air.
4. Among safety equipment used during collision of cars are .... and ....

(B) Give a reason for the following :

If you push two similar toy cars, one of them may travel for a longer distance than the other.

....

2 (A) Put (✓) or (✗) :

1. As human needs clean water to drink, fish needs clean air to breathe. (   )
2. Seatbelt is one of the safety equipment in cars. (   )
3. Animals communicate with each other by using different senses. (   )
4. The desert lizard blend in with large green trees, to hide from its enemies. (   )

(B) Find the speed of a runner, if you know that he covers 400 meters in 20 seconds.

....

....

---

3 (A) Write the scientific term of each of the following :

1. A group of ants which is responsible for protecting the colony from dangers. (........................)
2. An animal that has a layer of fat and dense feathers to adapt extreme cold weather. (........................)
3. The visible form of energy, that enable us to see. (........................)
4. A system that works inside the living organism's body such that it keeps the organism away from danger. (........................)

(B) What happens if ...?

Bats cannot use echolocation property.

....

....

---

4 (A) Choose the correct answer :

1. All the following sentences about energy are correct, except ....
   a. It can be stored in an object.
   b. It can be transferred from an object to another one.
   c. It can be transformed from one form into another one.
   d. It can be destroyed and cannot be created.
2. The blind person's cane and .... emit a high-pitched sound that bounces off objects forming an echo.
   a. lizards   b. polar bears   c. bull sharks   d. bats
3. Speed is a measurment of how .... something is moving.
   a. long   b. tall   c. fast   d. heavy
4. A very big truck needs .... to move.
   a. very small engine   b. small engine
   c. very big engine   d. no engine

(B) Write the senses that can be used in each of the following types of communication in the table below :

Types of communication	The used senses
1. Watching TV.	....
2. Flashing lights of fireflies.	....
3. Echolocation in dolphins.	....
4. Using the cell phone.	....

Model Exam 10

1 (A) Choose the correct answer :

1. Humans and cars are ....
   a. not able to produce sound energy.
   b. not able to produce kinetic energy.
   c. similar in obtaining energy to move.
   d. similar in adaptation to live and survive.
2. Push or pull actions are considered as types of ....
   a. force. b. device. c. energy. d. adaptation.
3. The nervous system can do all the following functions, except ....
   a. gathering information.
   b. processing information.
   c. sending signals.
   d. falling of rains.
4. The speed of an object is measured in .... or meters per seeond.
   a. kilograms per hour
   b. grams per second
   c. kilometers per hour
   d. kilograms per kilometers

(B) Give a reason for the following :

The spinal cord plays an important role in the nervous system to do its function.

....

....

2 (A) Complete the following sentences :

1. When you push a table on the floor, the .... transfers from your body to the table.
2. Echolocation property is used by .... and .... animals to locate their preys.
3. Most of .... energy in the Newton's cradle is transferred from the first ball to the rest of balls.
4. To increase the .... energy of any moving object we must increase its speed.

(B) A car moves forward a distance 100 kilometers in time equals 2 hours. Calculate the speed of the car.

....

....

3 (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Esophagus	a. absorbs water from the undigested food to become solid waste.
2. Small intestine	b. mixes the food with an acid and digestive juices.
3. Large intestine	c. the digestion begins in it.
4. Stomach	d. food gets completely digested in it.
5. Mouth	e. is a tube has muscles that move the food down into the stomach.
	f. solid waste leaves the body through it.

1. .... 2. .... 3. .... 4. .... 5. ....

(B) What happens if ... ?

You are standing on the ground and you let a ball out of your hand.

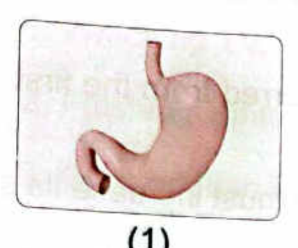
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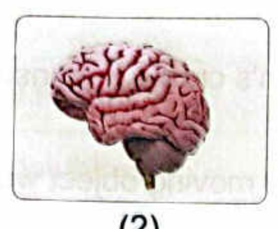
4 (A) Put (✓) or (✗) :

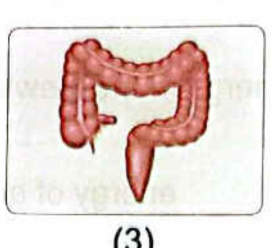
1. If two objects cover the same distance in the same time, so they have the same speed. ( )
2. In a complete dark room, you can use the senses of touching, tasting, smelling and hearing only. ( )
3. The moving objects only have energy, while the objects that don't move have no energy. ( )

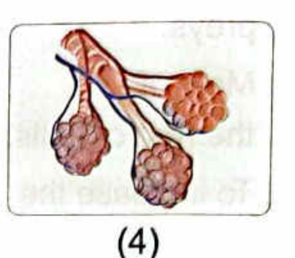
4. We cannot create a new form of energy, and also we cannot destroy an existed form of energy. ( )

(B) You have some pictures of different parts of the human body. Write down the organ number in front of the system to which it belongs in the following table :


(1)


(2)


(3)


(4)

System name	Organ number
1. Digestive system :	....
2. Respiratory system :	....
3. Nervous system :	....

Final Examinations

of some governorates



on the first term 2022

1 Cairo Governorate

Nasr City Educational Zone

1 Put (✓) or (✗) in front of the following statements :

1. Exhaled air carries oxygen. ( )
2. A person can identify spoiled food through the touch sense. ( )
3. The migration of birds to search for food is considered as form of behavioral adaptation. ( )
4. The skin is the sensory organ that makes you feel the smoothness of the cloth. ( )

2 Complete the following sentences:

1. The eye sends messages to .... through the nerves.
2. Bats use .... as a means of communication with each other.
3. The spinal cord is an important organ of the .... system.
4. A tube with muscles that helps to push food into the stomach, is called ....

3 Choose the correct answer :

1. One of the behavioral adaptations that helps the animal protect itself from enemies ....
   a. camouflage. b. extinction. c. migration. d. reproduction.
2. Animals can communicate with each other through ....
   a. sounds and lights. b. talking.
   c. reading. d. writing.
3. Which of the following allows the light to pass through it ? ....
   a. A rock. b. Moon. c. Wood. d. Glass.
4. Which of the following is a source of light ? ....
   a. Eye. b. Moon. c. Fire. d. Mirror.

4 (A) A dolphin can locate living organisms and things under the surface of the water. Explain why?

....

....

(B) Give one example :

An nocturnal animal that depends on its sense of heat to get its prey.

....

2 Cairo Governorate — Heliopolis Educational Zone

1 Choose the correct answer :

1. Raising the thumb up or lower it down is a kind of ....
   a. colors. b. codes. c. waves. d. lights.
2. Bats are .... animals.
   a. nocturnal b. morning c. not hearing d. not flying
3. If a car covered a distance of 10 meters in a time of 2 seconds, so the speed of the car is ....
   a. 50m/sec. b. 20m/sec. c. 20m/sec. d. 5m/sec.
4. The roots of palm plants help them to ....
   a. stand strong against the wind. b. reach the underground water.
   c. fixing plants in the soil. d. all the above.
5. The force that causes an object to move a distance is called ....
   a. work. b. potential. c. gravity. d. pull.

2 Put (✓) or (✗) :

1. The respiratory system is responsible for the entry of air into the body. ( )
2. Dolphins have a strong sight sense. ( )
3. Wood is a transparent object that allows light to pass through it. ( )
4. The seesaw moves up and down becasuse the forces that act on it are unbalanced. ( )
5. The force that slows down or decreases the speed of an object is gravity. ( )

3 (A) Write the scientific term of each of the following :

1. It is the gained energy during the motion of objects. (..........................)
2. A measuring unit for long distances. (..........................)
3. A type of adaptation that helps an animal to hide. (..........................)

(B) 1. Give a reason for the following :

Some dogs live in a cold environment, while other dogs live in a hot environment. In your opinion, which of them have thick fur ? And why ?

....

....

2. Give two examples :

Objects that are considered as sources of light.

....

....

3 Cairo Governorate — El-Sahel Educational Zone

1 Choose the correct answer :

1. One of the behavioral adaptations that helps the animal protect itself from enemies ....
   a. camouflage. b. extinction.
   c. immigration. d. reproduction.
2. .... is covering the body of arctic fox.
   a. Heavy clothes b. Heavy skin
   c. Thick fur d. Many feathers
3. .... are panting to lower their body temperature.
   a. Whales b. Owls c. Foxes d. Bats
4. The ability to do work is ....
   a. energy. b. force. c. push. d. pull.
5. Tapetum lucidum exists in all of the following, except ....
   a. horses. b. cats. c. humans. d. dogs.

2 Put (✓) or (✗) :

1. Exhaled air carries oxygen. ( )
2. When the roller coaster slides down fast, its kinetic energy increases. ( )
3. In the electric fan, the kinetic energy is converted into electric energy. ( )
4. Some animals can see at night. ( )
5. Human can identify spoiled food through touch sense.

3 (A) Choose from column (B) what suits it in column (A) :

Column (A)	Column (B)
1. Gravity	a. the energy stored inside the body.
2. Friction	b. the force that pulls things downwards.
3. Speed	c. a force that arises between the surfaces of two contacted bodies.
4. Potential energy	d. energy stored inside dry batteries.
	e. the distance covered per time unit.

1. .... 2. .... 3. .... 4. ....

(B) Calculate that speed of a runner that covers 150 meters in 10 seconds.

....

....

4 Cairo Governorate — El-Zeitoun Educational Zone

1 Choose the correct answer :

1. When light falls on a dark surface, ...
   - a. the surface absorbs the light.
   - b. light passes through it.
   - c. the light is refracted.
   - d. nothing happens.
2. What happens to living organisms that can't adapt to the conditions of their environment ? ....
   - a. Their number increases.
   - b. They can't stay in the environment.
   - c. They keep their number constant.
   - d. They can survive in the environment.
3. .... energy affects the sensory receptors in the eye causing vision.
   - a. Sound
   - b. Kinetic
   - c. Light
   - d. Magnetic
4. All of the following are examples of pulling force, <u>except</u> ....
   - a. kicking a ball.
   - b. pulling the rope.
   - c. opening the desk's drawer.
   - d. lifting up your bag.

2 Put (✓) or (✗) :

1. Human can identify spoiled food through touch sense. ( )
2. Bats use their sense of smell to avoid dangers. ( )
3. The skin is the sensory organ that makes you feel the smoothness of cloth. ( )
4. Energy is neither destroyed nor created from nothing. ( )

3 Choose from column (B) what suits it in column (A) :

(A)

Column (A)	Column (B)
1. Carbon dioxide 2. Exhalation	a. process that diaphragm expands and moves up. b. the process of pushing air in and out of the body. c. is a gas that is produced by respiration process.

1. .... 2. ....

(B)

Column (A)	Column (B)
1. Gravity 2. Friction 3. Speed 4. Potential energy	a. the energy stored inside the body. b. the force that pulls things downwards. c. a force that arises between the surfaces of two contacted bodies. d. energy stored inside dry batteries. e. the distance covered per time unit.

1. .... 2. .... 3. .... 4. ....

4 Complete the following sentences :

1. The lungs are one of the important organs in the .... system.
2. When light is reflected off a surface in different directions, so that surface is ....
3. The fat layer under the animal's skin to warm it is considered a .... adaptation.

5 (A) What is a common mean of communication between humans and some animals?

....

(B) A dolphin can locate living organisms and things under the surface of the water. Explain why ?

....

5 Giza Governorate — North Giza Educational Zone

1 Complete the following sentences using the words between brackets :

1. From the opaque objects .... (carton – glass)
2. Sensory receptors send a message .... (from the brain to the muscles – from the sensory organs to the brain)
3. When a person pushes a car forward, his body begins to sweat heavily because his body .... his stored energy. (consumes – increases)
4. The gas oven converts .... energy stored in the natural gas into heat energy to cook the food. (chemical – electrical)

2 Choose the correct answer :

1. When a body moves forward, the change that occurs is in ....
   a. the position of the body.   b. the size of the body.
   c. the mass of the body.   d. the Earth's gravity.

2. All the following represent the pushing force, <u>except</u> to ....
   a. kick a ball. b. press on electrical switch.
   c. close the disk's drawer. d. lifting up a bag.
3. The .... system helps us to translate messages that come from our surroundings, such as smells and sounds.
   a. respiratory b. digestive c. nervous d. circulatory
4. Raising the thumb up or lower it down is a kind of ....
   a. colors. b. codes. c. waves. d. lights.

3 Put (✓) or (✗) :

1. The ear is the sense organ which is responsible for seeing objects. (   )
2. The human digestive system breaks down food into nutrients. (   )
3. When the position of a body changes according to a fixed point, the body moves. (   )

4 (A) Calculate the speed of a train that covers 600 kilometers in a time of 6 hours.

....

(B) Look at the following figures, then answer the questions :

Fig. (A)

Fig. (B)

Which of the previous figures represents the reflection of light rays from a wooden spoon? And explain why?

....

....

5 Choose from column (B) what suits it column (A) :

Column (A)	Column (B)
1. Gravity 2. Friction 3. Speed 4. Potential Energy	a. the energy stored inside the body. b. the force that pulls things downwards. c. a force that arises between the surfaces of two contacted bodies. d. energy stored inside dry batteries. e. the distance covered per time unit.

1. .... 2. .... 3. .... 4. ....

6 Giza Governorate — 6th of October Educational Zone

1 Choose the correct answer :

1. One of the behavioral adaptation that helps animal protect itself from enemies is ....
   a. camouflage. b. extinction. c. reproduction. d. digestion.
2. The force that slows down (decreases) the speed is called ....
   a. push. b. gravity. c. friction. d. pull.
3. The organ responsible for the sight sense is ....
   a. the ear. b. the tongue. c. the nose. d. the eye.
4. Ability to do work is ....
   a. energy. b. force. c. push. d. pull.
5. An animal has the ability to turn its head in all directions is the ....
   a. snake. b. jerboa c. dolphin. d. owl.

---

2 Put (✓) or (✗) :

1. Wood is a transparent object that allows light to pass through it. ( )
2. A static ball moves on the ground if it is affected by a force. ( )
3. In the electric fan, the kinetic energy is converted into heat energy. ( )
4. Light travels in straight lines. ( )
5. Some animals can see at night. ( )

---

3 (A) Complete the following sentences using the words between brackets :

1. The speed of moving object = ... (distance x time – $\frac{\text{distance}}{\text{time}}$)
2. Fish have .... to breath. (gills – lungs)
3. One of the light reflecting materials is .... (wood – mirror)
4. .... is a source of light. (the Sun – the eye)

(B) Some dogs live in a cold environment, while others live in a hot environment. in your opinion, which of them have thick fur ? And why ?

....

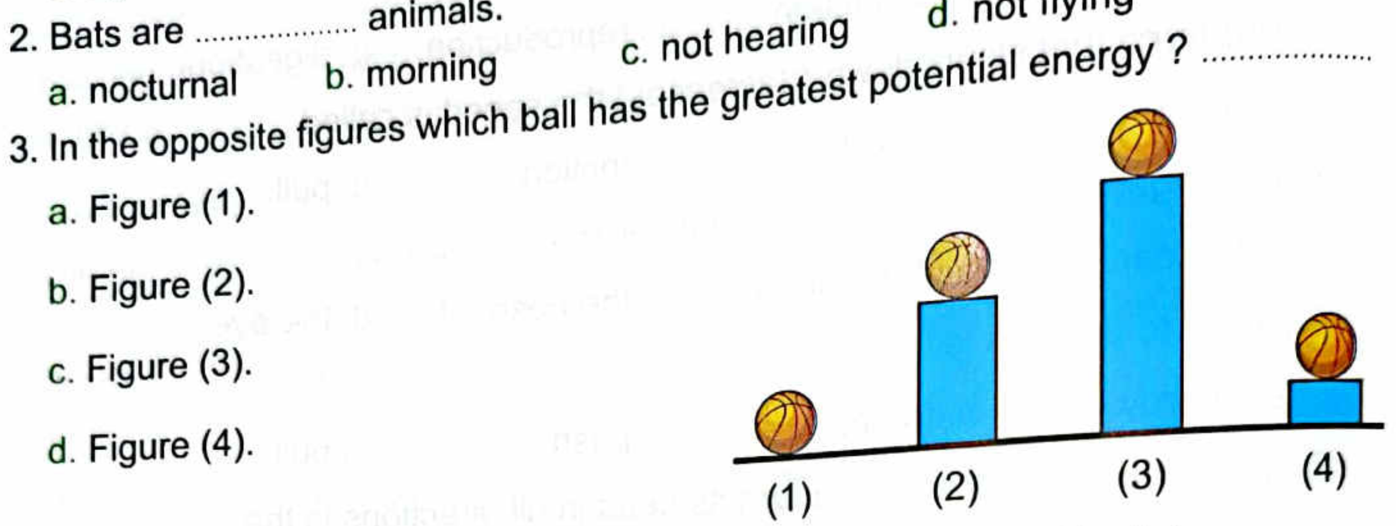
....

....

7 Alexandria Governorate

1 Choose the correct answer :

1. Which of the following is a source of light ? ....
   a. Eye. b. Moon. c. Fire. d. Mirror.
2. Bats are .... animals.
   a. nocturnal b. morning c. not hearing d. not flying
3. In the opposite figures which ball has the greatest potential energy ? ....
   a. Figure (1).
   b. Figure (2).
   c. Figure (3).
   d. Figure (4).



4. The force that pulls the objects down toward the center of the Earth is ....
   a. gravity. b. pushing. c. water. d. wind.
5. The force that slows down or decreases the speed of an object is ....
   a. push. b. gravity. c. friction. d. pull.

2 Put (✓) or (✗) :

1. Foxes have strong hearing sense. ( )
2. Wood is a transparent object that allows light to pass through it. ( )
3. Food turns from complex to simple during the digestion process. ( )
4. The chemical energy in a battery can be converted into electrical energy. ( )

3 Choose from column (B) what suits it in column (A) :

Column (A)	Column (B)
1. Camouflage	a. it helps us to see.
2. Smell	b. a type of adaptation that helps an animals to hide.
	c. ants use it to communicate.

1. .... 2. ....

4 (A) Complete the following sentences :

1. The different languages are considered as ....
2. During exhalation, ... gas comes out of the lung.

(B) Look at the following figures, then answer the questions :

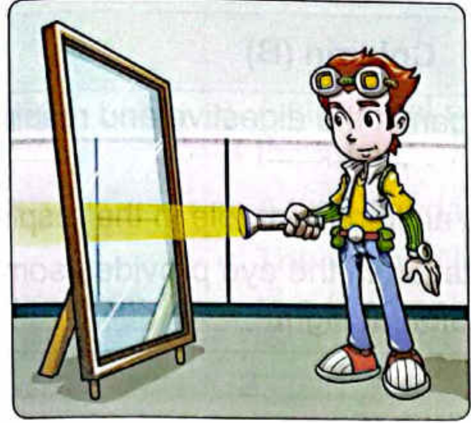

Fig. (A)


Fig. (B)

1. Which figure represents a transparent object ? (..........................)
2. Which figure represents an opaque object ? (..........................)

8 El-Qualyoubia Governorate — Obour Educational Zone

1 Choose the correct answer :

1. The organ responsible for the sight sense is ....
   a. the ear. b. the tongue. c. the nose. d. the eye.
2. One of the behavioral adaptations that helps the animal protects itself from enemies ....
   a. camouflage. b. extinction. c. immigration. d. reproduction.
3. .... energy affects the sensory receptors in the eye, causing vision.
   a. Sound b. Kinetic c. Light d. Magnetic
4. Animals can communicate with each other through ....
   a. sound and lights. b. talking.
   c. reading. d. writing.
5. The roots of palm plants help them to ....
   a. stand strong against the wind. b. reach the underground water.
   c. fixing plants in the soil. d. all the previous.
6. The force that pulls the objects down toward the center of the Earth is ....
   a. gravity. b. pushing. c. water. d. wind.
7. The chemical energy stored in batteries is considered a form of ....
   a. potential energy. b. kinetic energy.
   c. heat energy. d. light energy.

2 Put (✓) or (✗) :

1. Food turns from complex to simple during the digestion process. ( )
2. While running and making an effort, the number of breathing times decreases ( )
3. Sending bad smells by Acacia tree is a behavioral adaptation. ( )

Part 2

3 Match column (B) with column (A) :

Column (A)	Column (B)
1. Tapetum lucidum 2. Pharynx	a. it is a common organ in the digestive and respiratory systems. b. a muscle that has an important role in the respiration. c. a structural adaptation in the eye provides some animal a better vision at night.

1. .... 2. ....

4 Complete the following sentences from the two brackets :

1. .... destroys the lungs and causes many diseases. (Breathing – Pollution)
2. The speed of a moving object = ... (distance × time – $\frac{\text{distance}}{\text{time}}$)

5 Answer the following question :

Rabbits have long and strong hind legs that help them to jump quickly and escape in dangerous times. Determine the type of adaptation.

....

9 El-Sharkia Governorate — Al-Hessinia Educational Zone

1 Choose the correct answer :

1. One of the behavioral adaptations that helps the animal protect itself from enemies ....
   a. camouflage. b. extinction. c. immigration. d. reproduction.
2. All of the following are components of the nervous system, <u>except</u> ....
   a. spinal cord. b. heart. c. nerves. d. brain.
3. Objects need a force to move, this force is represented in (called) ....
   a. pushing only. b. pulling only.
   c. pushing and pulling together. d. the Earth gravity only.

2 Put (✓) or (✗) :

1. The Moon is a source of light. ( )
2. Red and green traffic lights are considered codes. ( )
3. When you kick a ball, kinetic energy is produced. ( )

3 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Motion 2. Gills 3. Camouflage	a. A structural adaptation whose function is similar to the lungs. b. A type of adaptation that helps an animal to hide. c. The change in the position of an object with respect to a fixed point.

1. ....   2. ....   3. ....

4 Complete the following sentences using the words between brackets :

1. The time that the body takes to react to different information from the environment is called .... (reflex action – reaction time)
2. Bats use .... as a means of communication with each other. (sound – light)
3. The ability to do a work is called .... (energy – gravity)

5 (A) Answer the following questions :

1. A dolphin can locate living organisms and things under the surface of the water. Explain Why?

....

2. When you sit on the chair without moving. What is the name of the force that pulls you downward ?

....

(B) Give a reason for the following:

The leaves of plants that float above the surface of the water are so wide.

....

10 El-Garbia Governorate — El-Santa Educational Zone

1 Choose the correct answer :

1. When a ball stands on the ground without moving, the forces acting on it are ....
   a. balanced. b. unbalanced. c. push it up. d. not equal.
2. The chemical energy stored in batteries is considered a form of ....
   a. kinetic energy. b. potential energy.
   c. heat energy. d. light energy.
3. The ability to do work is ....
   a. force. b. energy. c. pull. d. push.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Jerboa	a. it depends on the body's sense of heat for predation.
2. Snake	b. it depends on the echo of the sound in locating the prey
3. Bat	c. it depends on its hind legs to jump.

1. .... 2. .... 3. ....

3 Put (✓) or (x) :

1. Gravity pulls objects towards the center of the Earth. ( )
2. In the electric fan, the kinetic energy is converted into electric energy. ( )
3. When the roller coaster slides down fast, its kinetic energy increases. ( )

4 (A) If the two cars moved at the same time for 20 seconds, car (A) covered a distance of 100 meters, while car (B) covered a distance of [illegible] meters. Which of the two cars has a higher speed ?

....

....

(B) Calculate the speed of a train that covers 600 km in a time of 6 hours.

....

....

5 Complete the following sentences using the words between brackets :

1. .... is an opaque object.
(Carton – Glass)
2. .... is the organ that we can use to send or receive a light code.
(Eye – Heart)
3. The time that the body takes to react to different information from the environment is called ....
(reflex action – reaction time)

11 Kafr El-Sheikh Governorate — Al-Hamoul Educational Zone

1 Choose the correct answer :

1. Raising the thumb up or lower it down is a kind of ....
   a. colors. b. codes. c. waves. d. lights
2. The organ responsible for the sight sense is ....
   a. the ear. b. the tongue. c. the nose. d. the eye.
3. One of the behavioral adaptations that help the animal protect itself from enemies ....
   a. camouflage. b. extinction.
   c. immigration. d. reproduction.
4. An animal that has the ability to turn its head in all directions is ....
   a. snake. b. jerboa. c. dolphin. d. owl.
5. When a body moves forward, the change that occurs is in ....
   a. the position of the body. b. the size of the body.
   c. the mass of the body. d. the Earth's gravity.

2 Put (✓) or (✗) :

1. The ear is the sense organ which is responsible for seeing objects. ( )
2. The brain is responsible for processing information. ( )
3. Foxes have a strong hearing sense. ( )
4. In order for the code to be translated, the brain must identify it. ( )
5. Force is the ability to do work or cause change. ( )

3 Match column (B) to column (A) :

(A)	(B)
1. Light 2. Owl	a. an animal with a bowl-like face. b. it is the visible form of energy that is transmitted in the form of waves. c. it depends on its hind legs to jump.

1. .... 2. ....

4 Complete the following sentences from the two brackets :

1. .... is an opaque object. (Wood – Glass)
2. .... is the organ that we can use to send or receive a sound code. (Ear – Heart)
3. .... tree has long and strong roots to resist the water waves (Palm – Mangrove)

Part 2

12 El-Behira Governorate — Abou-Homous Educational Zone

1 Choose the correct answer :

1. Tapetum lucidum exists in all of the following, <u>except</u> ....
   a. the horse. b. the cat. c. the human. d. the dog.
2. Bats are .... animals.
   a. nocturnal b. morning c. not hearing d. not flying
3. When a body moves forward, the change that occurs is in ....
   a. the position of the body. b. the size of the body.
   c. the mass of the body. d. the Earth's gravity.
4. The force that slows down or decreases the speed of an object is ....
   a. push. b. gravity. c. friction. d. pull.

2 Put (✓) or (✗) :

1. The ear is the sense organ which is responsible for seeing objects. ( )
2. Exhaled air carries oxygen. ( )
3. In electric fan, the kinetic energy is converted into electric energy. ( )
4. Red and green traffic lights are considered codes. ( )

3 Complete the following sentences using the words between brackets :

1. If Noor travels with her bicycle a distance of 10 km in two hours, then she is moving at a speed of .... (10 km/hr. – 5 km/hr.)
2. What carries the message from your eyes to your brain when you see something ?
   .... (Nerves – Muscle)
3. What kind of energy is stored inside the battery ? ....
   (Chemical energy – Heat energy)
4. The force that pulls things down is to the ground .... (friction – gravity)

4 Match column (B) to column (A) :

(A)	(B)
1. Light 2. Smell	a. it depends on its hind legs to jump. b. it is the visible form of energy that is transmitted in the form of waves. c. ants use it to communicate.

1. .... 2. ....

13 Beni-Suef Governorate — Beba Educational Zone

1 Choose the correct answer :

1. An animal that has the ability to turn its head in all directions is ....
   a. snake. b. jerboa. c. dolphin. d. owl.
2. .... energy affects the sensory receptors in the eye, causing vision.
   a. Sound b. Kinetic c. Light d. Magnetic
3. All of the following are examples of pulling force, except ....
   a. kicking a ball. b. pulling the rope.
   c. opening the desk's drawer d. lifting up a ball.
4. A horse is faster than a human, as the human covers a .... distance at the same time.
   a. less b. greater c. double d. twice
5. Each of the following is considered a source of light, except ....
   a. the fire. b. the Sun. c. the lamp. d. the eye.

2 Put (✓) or (✗) :

1. The brain is responsible for processing information. ( )
2. When a pen falls down from your hand, then the acting force is the gravity force. ( )
3. Dolphins have a strong sight sense. ( )
4. Energy is neither destroyed nor created from nothing. ( )
5. Both humans and animals need a source of light to see. ( )

3 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Motion	a. a muscle that has an important role in the respiration process.
2. The spinal cord	b. it gives a message to the muscle to contract.
3. Diaphragm	c. the ability to do work.
4. Work	d. the change in the position of an object with respect to a fixed point.
5. Energy	e. the force that causes the body to move.
	f. electric energy is converted into kinetic energy.

1. .... 2. .... 3. .... 4. .... 5. ....

14 Assiut Governorate — Assiut Educational Zone

1 Choose the correct answer :

1. One of the behavioral adaptations that helps the animal protects itself from enemies ....
   a. camouflage. b. extinction. c. immigration. d. reproduction.
2. To communicate through the sight sense we need ....
   a. making a sound. b. availability of light.
   c. hearing music. d. touching something.
3. Each of the following is considered a source of light, except ....
   a. the fire. b. the Sun. c. the lamp. d. the eye.
4. All of the following are examples of pulling force, except ....
   a. kicking a ball. b. pulling the rope.
   c. opening the desk's drawer. d. dragging a car toy.
5. The ability to do work is ....
   a. energy. b. force. c. push d. pull.

2 (A) Put (✓) or (✗) :

1. If the acting forces on a moving body decrease, the speed of this body increases. ( )
2. The nervous system is responsible for breathing. ( )
3. Bats use their sense of smell to avoid dangers. ( )
4. Seeing with our eyes is a way to help us collect information about the environment around us. ( )

(B) Calculate the speed of a train that covers 600 kilometers in a time of 6 hours.

....

3 (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Carbon dioxide	a. a gas necessary for respiration.
2. Oxygen	b. a structural adaptation whose function is similar to the lungs.
3. Gills	c. it helps us to see.
	d. is a gas that is produced during respiration process.

1. .... 2. .... 3. ....

(B) Look at the opposite figure, then answer the question :

When the compressed spring is released, a change in energy occurs from .... energy to .... energy.

15 Sohag Governorate — Sohag Educational Zone

1 Complete the following sentences from the two brackets :

1. From the opaque objects .... (carton – glass)
2. The amount of energy required to move an object through the force acting on is called .... (work – potential)
3. From the organs that we can use to send or receive the code .... (heart – ear)
4. The echo sound feature depends on .... (hearing sense – sight sense)
5. .... destroys the lungs and causes many diseases. (Breathing – Pollution)
6. .... mix and grind food inside the mouth. (Teeth only – Teeth and tongue)

2 Put (✓) or (✗) :

1. Wood is a transparent object that allows light to pass through it. ( )
2. The digestive system in animals breaks down food into simple substances. ( )
3. Animals digging holes are a form of structural adaptation. ( )
4. Snakes have the ability to rotate their heads in all directions. ( )
5. When the position of the body changes according to a fixed point, the body moves. ( )

3 Answer the following :

1. Which of the following consumes less fuel a truck or a small car ?
....
2. When you sit on the chair without moving. What is the name of the force that pulls you downward ?
....


EL-MOASSER
SERIES
4th
Primary
2023
FIRST TERM
SCIENCE
Guide Answers
By A Group of Supervisors

PART 1

UNIT ONE : Living Systems

Concept (1.1)

Exercises on Lesson 1

1
1. d 2. d 3. a 4. b
5. d 6. a 7. c 8. b
9. b 10. d 11. b 12. b
13. d

2
1. c → B 2. d → C
3. a → D 4. b → A

3
1. (✗) 2. (✓) 3. (✓) 4. (✗)
5. (✓) 6. (✗) 7. (✗)

4
1. habitat
2. predator – prey
3. adaptation
4. camouflage

5
1. Adaptation.
2. Penguin.
3. Thick white fur.
4. Fennec fox.
5. Camouflage.

6
1. fat – feathers.
2. blood vessels
3. black – brown – white
4. fennec fox – caracal
5. starred agama – fennec
6. warm – white
7. colorful scales
8. penguin – polar bear.
9. predators – camouflage

7
1. To keep its body cool during hot sunny days.
2. To keep its body warm.
3. To keep its toes from freezing as the warm blood vessels heat up the cold blood vessels.
4. To hide among the colorful rocks in the desert.
5. Fennec fox has a sandy-colored fur to blend in with desert landscapes, while polar bear has a white fur to blend in with snow in polar region.
6. Because camouflage helps some animals hide from their predators or preys in different environments.

8
1. The blood in the penguin's feet will be very cold so, the penguin cannot walk on ice and its toes may freeze.
2. It cannot adapt with the very cold weather in polar regions.
3. It cannot hide and hunt its preys in the desert environment.
4. They cannot hide from their predators or preys in their environments.

9
1.

P.O.C.	Penguin	Fennec fox
1. Habitat :	Polar habitat	Desert habitat
2. Body coat :	Dense feathers	Sandy-colored fur

2.

P.O.C.	Polar bear	Forest bear
1. Habitat :	Polar habitat	Forest habitat
2. Fur color :	White	Dark

10 ⓑ and ⓓ

Exercises on Lesson 2

1
1. d 2. c 3. a 4. b
5. b 6. a 7. c 8. c
9. a 10. d 11. a 12. b
13. a 14. a 15. b

2
1. b → C
2. d → A
3. a → B
4. c → D

3
1. (✓) 2. (✗) 3. (✗) 4. (✗)
5. (✓) 6. (✓) 7. (✓) 8. (✓)
9. (✓) 10. (✗) 11. (✗) 12. (✓)
13. (✓) 14. (✗) 15. (✗)

4

Animal	Its adaptation	Structural or Behavioral adaptation
1. Penguin	Has blood vessels weave around each other.	Structural.
2. Polar bear	Has thick white fur.	Structural.
3. Arctic fox	Changes the color of its fur.	Structural.
4. Fennec fox	Hiding inside burrows to stay cool.	Behavioral.
5. Panther chameleon	Has eyes face opposite directions.	Structural.

5
1. Structural adaptation.
2. Behavioral adaptation.
3. Fennec fox. 4. Panting.
5. Arctic fox.
6. Panther chameleon.
7. V-shaped feet.
8. Countershading.

6
1. structural – behavioral
2. structural – behavioral

3. fennec – arctic
4. fennec – arctic
5. structural – behavioral
6. arctic – fennec
7. white – brown
8. fresh – salt
9. structural
10. structural
11. behavioral – structural

7
1. • To hide in a sandy, rocky environment.
   • To protect it from the hot Sun.
2. To cool its body.
3. To keep its body warm in extreme cold climate.
4. To help it sneaks up on prey in any season.
5. Burrow is an excellent place for :
   - Fennec fox to stay cool during the sunny day.
   - Arctic fox to stay warm at night.
6. Extra-large ears help the fennec fox to lose the heat to cool its body, while short ears help the arctic fox to stay warm.

7. Because other types of sharks live in salt water only.
8. To hold tightly the branches of trees.

8
1. It cannot hide from its prey in winter or summer.
2. It cannot cool its body.
3. They cannot hunt.
4. It cannot sneak up on prey in summer season.
5. The panther chameleon cannot hunt its prey and avoid becoming a prey at the same time.
6. It puffs up its body with air, opens its mouth wide and changes the color of its scales.

9
1. Fennec fox (all items live in cold regions, while fennec fox lives in hot regions).
2. Bull shark (all items live on land, while bull shark lives in water).
3. Panther chameleon (all items have fur on their bodies, while panther chameleon has scales on its body).

10

P.O.C.	Fennec fox	Arctic fox
1. Habitat :	Hot desert	Cold desert
2. Color of fur :	Tan-colored	White during winter & brown in summer
3. Shape of ears :	Extra-large	Short
4. Time of entrance to burrows :	During the sunny days	At night

11
1. S 2. B 3. S
4. S 5. S 6. B

12
1. It pants like dogs to cool its body.
2. It searches for a shaded area during a hot sunny day.
3. It hunts during the day and at night, so it can surprise its prey.
4. It puffs up its body with air during danger.

13
1. Arctic fox – It lives in tundra desert.
2. winter – summer
3. To sneak up on prey in any season.
4. - Structural adaptation : it has short ears and legs to help it stays warm.
   - Behavioral adaptation : it lives in burrows to stay warm at night.

Exercises on Lesson 3

1
1. b 2. c 3. d 4. d
5. c 6. c 7. c 8. c
9. b 10. d 11. c 12. b
13. d 14. c 15. b 16. c
17. d 18. b 19. b 20. a

2
1. b 2. e 3. f 4. a 5. d

3
1. (✗) 2. (✓) 3. (✓) 4. (✗)
5. (✓) 6. (✗) 7. (✗) 8. (✓)
9. (✗) 10. (✓) 11. (✓) 12. (✗)
13. (✗) 14. (✓) 15. (✓) 16. (✗)

4
1. Acacia tree.
2. Taproot.
3. Sharp spines.
4. Kapok tree.
5. Buttress roots.
6. Trunk.
7. Mangrove tree.
8. Water lily plant.
9. Wide leaves.
10. Needle leaves.

5
1. a poison – body
2. soggy 3. wind
4. bats

5. acacia tree – Palm tree – barbary fig plant.
6. acacia – pine
7. float – sunlight.
8. water – roots.
9. mangrove – palm
10. water lily – kapok

6
1. To prevent animals from reaching its leaves to feed on.
2. To prevent animals from eating these leaves.
3. Because acacia tree uses wind to send smelly message to acacia trees nearby telling them to start making a poisonous substance.
4. To allow wind to move more gently through the leaves without tearing them.
5. Due to presence of large, wide roots called buttress roots.
6. To allow the snow slide easily over it, so its branches don't break.
7. To absorb a large amount of sunlight.
8. To resist the water waves.
9. To resist the strong winds.
10. To prevent animals from eating its fruits and leaves.

7
1. It can't search for water in the deep soil.
2. Animals can eat these leaves easily.
3. Kapok tree can't stay firmly in soggy soil.
4. The snow can't slide easily over its branches and the branches break down more easily.
5. The sunlight can't reach these plants easily.
6. It can't absorb a large amount of sunlight.
7. It can't resist the strong winds.

8
1. Buttress roots (all items belong to acacia tree, while buttress roots belong to kapok tree).
2. Taproot (all items belong to kapok tree, while taproot belongs to acacia tree).
3. Mangrove tree (all items live in desert habitat, while mangrove tree lives in salt water habitat).
4. Acacia tree (all items live in snow habitat, while acacia tree lives in savannah habitat).

9
1.

P.O.C.	Acacia tree	Kapok tree
1. Type of roots :	Taproot	Buttress roots
2. Shape of leaves :	Tiny leaves	Hand-shaped leaves

2.

P.O.C.	Kapok tree	Water lily plant	Pine tree
1. Habitat:	Rainforest	Wetland	Snow
2. Shape of leaves :	Hand-shaped leaves	Wide leaves	Needle leaves

10
1. ...... wetland ...... leaves ...... sunlight.
2. ...... long ...... winds ...... palm ......
3. ...... snow ...... short ...... water.

11

Organisms live in deserts	Organisms live in forests
– Starred agama lizard. – Fennec fox. – Palm tree. – Barbary fig plant.	– Panther chameleon. – Kapok tree.

Exercises on Lesson 4

1
1. d 2. b 3. c 4. c
5. d 6. d 7. d 8. a
9. c 10. b 11. d 12. d
13. b 14. d 15. c 16. b
17. a 18. b 19. d 20. b
21. d 22. c 23. d 24. b

2
1. 1. e 2. d 3. a 4. b 5. c
2. 1. d 2. c 3. a 4. b

3
1. (✗) 2. (✗) 3. (✗) 4. (✗)
5. (✗) 6. (✗) 7. (✗) 8. (✓)
9. (✗) 10. (✓) 11. (✓) 12. (✗)
13. (✓) 14. (✗) 15. (✗) 16. (✓)
17. (✗) 18. (✓)

4
1. Digestive system.
2. System.
3. Digestion process.
4. Mouth. 5. Teeth.
6. Saliva. 7. Stomach.
8. Small intestine.
9. Anus. 10. Esophagus.
11. Respiration process.
12. Alveoli. 13. Diaphragm.

5
1. digestive – respiratory
2. teeth – tongue
3. stomach – small intestine.
4. esophagus – small intestine
5. small intestine.
6. liver – pancreas
7. blood vessels.
8. small – large
9. respiratory
10. bronchioles – alveoli.
11. trachea.
12. diaphragm.
13. downward – upward.

6
1. To perform different functions.
2. Because they help in breaking down food into nutrients.
3. Because solid wastes leave the body through it.

4. Because the inhaled air is rich in oxygen gas, while the exhaled air is rich in carbon dioxide gas.
5. Because it contracts and moves downward during inhalation to increase the size of chest, while it relaxes and moves upward during exhalation to decrease the size of chest.

7
1. The digestive system could not do its function correctly.
2. The blood carries these nutrients to all the body parts.
3. The size of chest increases, the air rich in oxygen gas enters the lungs.
4. The size of chest decreases, the air rich in carbon dioxide gas comes out of the lungs.

8
1. Saliva (all items are organs through which food passes in the digestive system, while saliva is a juice that is secreted to help in digestion of food).
2. Lungs (all items belong to the digestive system, while lungs belong to the respiratory system).
3. Anus (all items belong to the respiratory system, while anus belongs to the digestive system).

9 Organ (1) : Esophagus.
Organ (2) : Small intestine.
Organ (3) : Large intestine.
Organ (4) : Trachea.

10

P.O.C.	Inhalation	Exhalation
1. Diaphragm movement :	downwards	upwards
2. Size of chest cavity :	increases	decreases
3. The air is rich in :	oxygen gas	carbon dioxide gas

11

The organ	The system	
	Digestive	Respiratory
1. Trachea		✓
2. Anus	✓	
3. Stomach	✓	
4. Lungs		✓
5. Small intestine	✓	
6. Esophagus	✓	
7. Diaphragm		✓
8. Nose		✓
9. Large intestine	✓	
10. Liver	✓	
11. Pancreas	✓	

12
1. Mouth – saliva
2. Esophagus – stomach.
3. Stomach – stomach – digestive
4. Small intestine – pancreas – liver – nutrients.
5. Large intestine – water – undigested
6. Anus – wastes.

13 ① Nose. ② Throat.
③ Trachea. ④ Two bronchi.
⑤ Bronchioles. ⑥ Alveoli.
⑦ Two lungs. ⑧ Diaphragm.

14 (1) a (2) b
(3) diaphragm – increases
(4) carbon dioxide

Exercises on Lesson 5

1 1. c 2. d 3. c 4. b
5. d 6. b 7. d 8. d
9. d 10. a 11. c

2 1. d 2. a 3. c

3 1. (×) 2. (×) 3. (×) 4. (✓)
5. (×) 6. (✓) 7. (×) 8. (×)
9. (✓) 10. (✓) 11. (✓) 12. (✓)
13. (×) 14. (✓) 15. (✓)

4 1. oxygen gas 2. Water
3. oxygen gas
4. structural adaptation
5. rapidly 6. Wildfires
7. animals, plants and humans
8. Air pollution

5
1. Gills.
2. Oxygen gas.
3. Carbon dioxide gas.
4. Water pollution.
5. Air pollution.

6 1. lungs – gills 2. blood
3. structural
4. strong wind – wildfires
5. air – water 6. pollution.
7. smog.
8. damage of lungs – asthma

7
1. Because they enable fish to extract oxygen gas from water for respiration.
2. Because rapid changes may cause death or disappearance or even extinction of some living organisms, while slow changes give a chance for organisms to adapt to survive.
3. Because they produce smog which causes damage of lungs, asthma and heart diseases.
4. To decrease air pollution.

8
1. Living organisms will be able to adapt over time to survive.
2. Living organisms may die, disappear or even become extinct.
3. The pollution of air, water and soil will increase.

4. Smog increases causing breathing problems as damage of lungs, asthma and heart diseases.
5. Humans cannot found clean water to drink and fish cannot found clean water to breathe.

9 1. c 2. a

Exercises on Lesson 6

1 1. b 2. c 3. a 4. d 5. d 6. b 7. a 8. d 9. c 10. d

2 1. (✓) 2. (✗) 3. (✗) 4. (✓) 5. (✗) 6. (✓) 7. (✓) 8. (✓) 9. (✓)

3 1. Amphibians. 2. Skin.
3. Oxygen gas.
4. Structural adaptation.
5. Lung.

4 1. reptile – amphibian.
2. lungs
3. gills – lungs – skin.
4. gills 5. decreases.
6. lungs – skin. 7. structural
8. carbon dioxide gas
9. air – water

5 1. water. 2. wet
3. an amphibian. 4. lungs
5. oxygen gas 6. amphibians.
7. Amphibians 8. air.

6 1. Because skin of frog can absorb oxygen gas directly from water, while fish cannot.
2. Because their skin must be wet all the time, to be able to extract oxygen gas directly from water.
3. Because they breathe in oxygen gas from water and air.
4. To help them survive.

7 1. The number of amphibians will decrease.
2. Amphibians will survive and their numbers increase.
3. They can live only under water.
4. The number of amphibians will decrease.
5. Salamanders can live on land only.
6. They cannot survive.

8 1. (✗) 2. (✓) 3. (✓)

Model Exam on Concept (1.1)

1 (A) 1. d 2. b 3. b 4. a
(B) Because they enable fish to extract oxygen gas from water for respiration.

2 (A) 1. (✗) 2. (✗) 3. (✗) 4. (✓)
(B) The size of chest decreases, the air rich in carbon dioxide gas comes out of the lungs.

3 (A) 1. Wildfires
2. Amphibians
3. oxygen gas
4. Water lily plant
(B) It hunts in different places like salt water or fresh water.

4 (A) 1. Thick white fur.
2. Countershading.
3. Mangrove tree.
4. Anus.
(B) 1. Acacia tree (all items live in snow habitat, while acacia tree lives in savannah habitat).
2. Bull shark (all items live on land, while bull shark lives in water.

Concept (1.2)

Exercises on Lesson 1

1 1. c 2. d 3. d 4. d 5. b

2 1. (✗) 2. (✓) 3. (✓) 4. (✗) 5. (✗) 6. (✓)

3 1. Echolocation. 2. Eyes.
3. Nose. 4. Touch.

4 1. smell – hearing
2. hearing.
3. hearing – echolocation
4. smell

5 1. hearing. 2. eyes
3. nose

6 1. To communicate with other mongooses to move from one place to another or when searching for food.
2. Because owls have extraordinary senses of hearing and sight that make them able to find their preys in the dark.
3. Because dogs have very sharp senses of hearing and smell.
4. Because dolphins have super sense of hearing, so they can hear all kinds of sound.

7 The sound waves bounce back to the dolphin in the form of echo so, the dolphin can detect the location of this object.

8 (1) The sound produced by a dolphin ......
(2) The sound waves travel and hit the prey ......
(3) The echo helps the dolphin ......

9 1. b 2. d 3. a 4. c

Exercises on Lesson 2

1 1. d 2. d 3. b 4. b 5. d 6. c 7. d 8. c

9. d 10. d 11. a 12. d
13. d 14. d 15. c 16. d

2 (1) 1. d 2. a 3. b
(2) 1. d 2. e 3. a 4. c

3 1. (✗) 2. (✗) 3. (✓) 4. (✗)
5. (✓) 6. (✗) 7. (✗) 8. (✗)
9. (✓)

4 1. Nocturnal animals.
2. Snake. 3. Echolocation.
4. Owl.
5. Nervous system.
6. Brain. 7. Spinal cord.
8. Sense organs.
9. Sensory receptors.

5 1. heat – echolocation.
2. dolphins – bats.
3. hearing – sight.
4. head – eyes
5. spinal cord.
6. electrical impulses
7. eyes – brain.

6 1. tasting 2. backbone.
3. echolocation. 4. brain.
5. stronger

7 1. Because the weather becomes cool at night in these regions.
2. To locate their preys at night through sensing their body heat.
3. To pick up and amplify distant sounds then direct these sounds into the owls' ears.
4. Because snakes have the ability to sense the heat of the preys' bodies by using a special body part in their faces.

8 1. It cannot sense the heat of its preys body at night, so it cannot hunt at night.
2. They cannot hunt at night.
3. They cannot search for preys everywhere, but in one direction only.

9 a. The nervous system.
b. ① Brain. ② Spinal cord.
③ Nerves.
c. 1. ② 2. ① 3. ③

Exercises on Lesson 3

1 1. d 2. c 3. a 4. a

2 1. (✗) 2. (✗) 3. (✓) 4. (✓)
5. (✗) 6. (✓) 7. (✗)

3 1. Egyptian jerboa.
2. Reaction time.
3. Nervous system.
4. Brain.

4 1. behavioral 2. structural
3. hearing – ears.
4. hind legs – catch sand when it jumps.
5. ears – brain 6. reaction time.

5 1. quickly. 2. hair.
3. nervous 4. structural

6 1. Because it has long hind legs that make it jump for long distances.
2. To help it grip the sand when it jumps.
3. Because it has large and sensitive ears, so it can detect even a quiet snake.

7 1. The hand will move quickly away in less than one second.
2. It hops in zigzag patterns, so it can escape quickly from danger.

8 a. Structural adaptation.
b. Sandy color of jerboa helps it hides easily in sandy environment, so it can sneak up on its preys and hide easily from its enemies.

9 (1) A jerboa hears ......
(2) The sensory receptors that found ......
(3) The brain processes ......
(4) The brain alerts the jerboa's legs ......
(5) The jerboa jumps ......

Exercises on Lesson 4

1 1. b 2. a 3. a 4. b
5. b 6. c

2 1. c 2. e 3. d 4. a

3 1. (✗) 2. (✗) 3. (✓) 4. (✓)

4 1. brain. 2. nerves
3. sensory receptors

5 1. faster 2. Nerves
3. hand – brain 4. tongue
5. faster

6 1. Because the ears sent a signal to the brain to avoid being hit by a car.
2. Because the ears sent a signal to the brain that processes the information and transmits a message to the leg muscles to run.

7 1. The prey may run away from the snake.
2. The jerboa will be eaten by the snake.
3. The cup may be broken.
4. The bat may hit the wall.

8 (1) Hearing the whistle ......
(2) The nerves of the ears ......
(3) The brain processes ......
(4) The brain sends a signal ......

9 Maha, because the brain can process the messages from the eyes faster than the messages from the ears.

Exercises on Lesson 5

1 1. d 2. a 3. b 4. a
5. d 6. c

2 1. (✓) 2. (✓) 3. (✓) 4. (✗)

3 1. Nerves. 2. Taste.
3. Reflexes.

4 1. nose 2. brain
3. reflexes.
4. sensory receptors – brain.
5. ear – nose
6. ears – brain

5 1. sensory receptors
2. hearing. 3. brain

6 1. Eyes all items are senses, while eyes are sense organs).
2. Taste (all items are sense organs, while taste is a sense).
3. Lungs (all items belongs to the nervous system, while lungs belong to the respiratory system).

7 1. Because ears receive the different sounds and transmit them to the brain to be processed, so brain can determine the type of music.
2. Because it is the main control center of the body.

8 1. Messages cannot be transmitted between brain and body parts.
2. Brain cannot process what is seen by the eyes.

9 1. nervous
2. ② – ③ – ①

10 1. ①, ⑤ 2. ③, ⑥ 3. ②, ④

Model Exam on Concept (1.2)

1 (A) 1. a 2. a
3. d 4. c
(B) To help it jump long distances.

2 (A) 1. ears 2. brain
3. hearing. 4. weaker
(B) They cannot search for preys everywhere, but in one direction only.

3 (A) 1. Reaction time.
2. Taste.
3. Nervous system.
4. Brain.
(B) 1. Nerves.
2. Spinal cord. 3. Brain.

4 (A) 1. nose 2. faster
3. behavioral
4. hearing – sight.
(B) (1) Hearing the whistle ...
(2) The nerves of the ears ...
(3) The brain processes ...
(4) The brain sends a signal ...

Concept (1.3)

Exercises on Lesson 1

1 1. b 2. c 3. d 4. c
5. d 6. b 7. d 8. c

2 1. (✓) 2. (✓) 3. (✓) 4. (✓)
5. (✗) 6. (✓) 7. (✗)

3 1. light 2. mirror-like
3. sources of light.
4. bounce

4 1. Eye. 2. Fishing cats.
3. Sources of light.
4. Brain. 5. The Moon.
6. Night vision goggles.
7. Light.

5 1. different
2. light energy.
3. Sun
4. nervous system.
5. back 6. Light
7. brain 8. black

6 1. sight – heat 2. light – sound
3. structural 4. reflect
5. candles – mirror – the Moon.
6. structural – behavioral

7 1. Because it has a mirror-like membrane on the back of its eyes which bounces off the light.
2. Because it gives off their own light.
3. Because it does not give off its own light, but it reflects the light.

8 1. Fishing cat can't see at night.
2. It seems to be dark and we can't see it.
3. Their eyes cannot be affected by light, so they cannot see.

9 1. The Moon (all items are sources of light, while the Moon is reflecting the light).
2. Candle (all items are reflecting the light, while candle is a source of light).

10 1. Sense of sight.
2. Sense of sight and sense of hearing.
3. Sense of hearing.

Exercises on Lesson 2

1 1. b 2. b 3. b 4. c 5. b 6. c 7. d 8. d 9. c 10. b

2 1. e 2. c 3. a 4. d

3 1. (✓) 2. (✓) 3. (✗) 4. (✓) 5. (✗) 6. (✓)

4 1. Nocturnal animals.
2. Tarsier.

5 1. strong 2. bigger
3. Tarsier 4. owl

6 1. smaller – wider
2. hearing – touch – smell.
3. eyes – fishing cat
4. owl – sockets.
5. light – nocturnal
6. hearing – sight.
7. owl – tarsier – fennec
8. owl – tarsier – panther chameleon

7 1. Because nocturnal animals have bigger eyes which are more sensitive to light than human and their pupils usually open wider than human.
2. Because they can turn their heads 180 degrees.
3. To gather and reflect any light available to give them a picture of their surroundings.

8 They can't see in all directions.

Exercises on Lesson 3

1 1. b 2. a 3. a 4. d

2 1. (✗) 2. (✓) 3. (✓) 4. (✓)

3 1. Eyes.
2. Tapetum lucidum.

4 1. tapetum lucidum.
2. structural
3. tapetum lucidum – echolocation
4. reflects 5. light
6. hearing – sight
7. light – sound – ears

5 1. Because it reflects light like a mirror, allowing the eye to collect more available light.
2. Because eyes of human don't contain tapetum lucidum.

6 The eyes of snakes will glow at night and they get excellent night vision.

Exercises on Lesson 4

1 1. c 2. d 3. b 4. d 5. c 6. d 7. b 8. a 9. c

2 1. e 2. c 3. d 4. a

3 1. (✗) 2. (✗) 3. (✓) 4. (✓) 5. (✓)

4 1. Transparent materials.
2. Opaque materials.
3. Rough surface.

5 1. reflection 2. Transparent
3. Smooth

6 1. straight 2. waves.
3. opaque – transparent
4. opaque – light
5. rough – light
6. metal – opaque – don't allow
7. less
8. transparent – glass – lenses

7 1. Because the opaque body doesn't allow light to pass through.
2. Because the glass cup is considered a transparent material which allows light to pass through.
3. Because the mirror is more smooth than the painted surface.

8 1. Light can't pass through the opaque object to the wall, so shadow of the object is formed on the wall.
2. Light passes through the glass window.
3. Light rays are reflected in different directions.

9 (1) Light rays bounce off ......
(2) The reflected light travels ......
(3) Special nerves in the eyes ......
(4) The brain interprets ......

10 1. a. smooth surface.
– The rays are reflected at the same angle at which they strike the object originally.
b. rough surface.
– The rays are reflected in different directions.
c. straight
2. c

11

Smooth materials	Rough materials
• Mirror. • Metal.	• Piece of cloth. • Wood. • Paper.

12

Opaque objects	Transparent objects
• Wood. • Metal.	• Air. • Water. • Lenses.

Model Exam on Concept (1.3)

1 (A) 1. d 2. c 3. b 4. c

(B) Because the glass is considered as a transparent material, which allows light to pass through.

2 (A) 1. (✗) 2. (✓) 3. (✓) 4. (✓)

(B) Light rays will reflect in different directions.

3 (A) 1. brain – eyes
2. vision – hearing
3. nocturnal – reflects
4. rough – light

(B) 1. The Moon (all items are sources of light, while the Moon reflects the light).
2. Dolphin (all items are using their excellent night vision to hunt, while bat is using echolocation to hunt).

4 (A) 1. Sources of light.
2. Tapetum lucidum.
3. Transparent objects.
4. Light.

(B) - Fishing cat depends on vision, because it has tapetum lucidum which reflects light to see more at night.
- Bat depend on echolocation, because it has poor night vision.

Concept (1.4)

Exercises on Lesson 1

1 1. c 2. d 3. d 4. d
5. a 6. a 7. c

2 1. c 2. b 3. d

3 1. (✓) 2. (✓) 3. (✗) 4. (✓)
5. (✗) 6. (✗)

4 1. chemical 2. humans.

5 1. sight – hearing.
2. communicate – a mate
3. chemical reaction
4. flash pattern
5. language – speech.
6. hearing – sounds.
7. sight – hearing.
8. hearing – dolphins – bats.
9. reading – writing.
10. movement – displaying light.

6 1. To communicate with each other.
2. To warn off their predators or to attract a mate.
3. To light up their bodies and communicate with each other.

7 1. The fireflies imitate the flashing pattern that the person made.
2. It produces a chemical reaction inside its body to light up and attract a mate.

8

Items	Light	Sound	Both
1. Car lamps.	✓		
2. Television.			✓
3. Traffic lights.	✓		
4. Radio.		✓	

9 1. (✓) 2. (✓) 3. (✗) 4. (✓)

Exercises on Lesson 2

1 1. a 2. d 3. d 4. d
5. b 6. c 7. c 8. b

2 1. b 2. a 3. d 4. e

3 1. (✓) 2. (✗) 3. (✓) 4. (✓)
5. (✗) 6. (✓)

4 1. different 2. summer.
3. High 4. different
5. fast

5 1. Winter. 2. Summer.
3. High-pitched sounds.
4. Low-pitched sounds.
5. Ear. 6. Eye.
7. Code.

6 1. hearing – notes (tones) – songs.
2. high – cold
3. summer – low
4. sound – light
5. light – sound
6. hearing 7. sight

7 1. Because high-pitched sounds travel better through cold water.
2. To communicate with each other in different seasons.
3. To give a specific meaning according to the arrangement of letters in a word.
4. To help people predict our feelings.

8 1. They cannot communicate by songs using their hearing sense.
2. The eyes send a message to my brain to stop walking and not cross the road.

9 1. (2) 2. (1) 3. (2)
4. (1) 5. (1) 6. (2)

Exercises on Lesson 3

1 1. d 2. c 3. d
4. b 5. b

2 1. (✓) 2. (✓)

3 1. Morse code. 2. Dots.
3. Dashes.

4 1. communication – sound – light
2. short – long
3. dashes – dots.
4. sight – hearing

5 ① A ② D ③ A ④ P
⑤ T ⑥ A ⑦ T ⑧ I
⑨ O ⑩ N ⑪ adaptation.

Exercises on Lesson 4

1 1. c 2. d 3. a 4. a
5. b 6. c 7. d

2 1. d 2. c 3. b

3 1. (✓) 2. (✗) 3. (✗) 4. (✗)

4 1. food 2. eight
3. sight. 4. different
5. Soldier

5 1. Scout bees. 2. Sight.
3. Ants. 4. Nurse ants.

6 1. food – water 2. wings – code
3. sign language.
4. nurse – scout – soldier
5. smell – movements
6. smelly 7. acacia
8. sight

7 1. To communicate with other bees to find food and water resources.
2. To alert the scout ants that the food is low.
3. To communicate with the other ants in case of danger.

8 1. They cannot communicate to reach to the location of food and water resources.
2. He cannot communicate with the other people.
3. They cannot communicate with each other by smelly messages.
4. The nurse ants send smelly messages to scout ants to alert the ants where to find the food.
5. The soldier ants send smelly messages to alert the other ants that there is a danger nearby.

9 1. (2) – (1) 2. (1)
3. (2)

Exercises on Lesson 5

1 1. d 2. d 3. a
4. a 5. d

2 1. (✗) 2. (✗) 3. (✓)
4. (✗) 5. (✗)

3 1. Bat.
2. The special cane of blind people.

4 1. echolocation
2. wings – vibrations
3. vibrations

5 1. To tell the blind person where objects are around him.
2. Because their special canes emit a high-pitched sound that human's ears cannot hear it.

6 1. It bounces back to the cane in the form of echo which is turned into vibrations.
2. They cannot communicate with each other or locating the objects by the sense of hearing.
3. The cane will make vibrations that tell the blind person that there is a wall in front of him.

7 1. Honeybees (All items can communicate by sounds while honeybees can communicate by flash lights).
2. Fireflies (All items use echolocation in communication while fireflies use flash lights in communication).

8 1. (1) – (2) 2. (1) – (3)

9

Devices	Inspired from the adaptation of
1. Blind people cane.	Bats.
2. Night vision goggle.	Cats.

Model Exam on Concept (1.4)

1 (A) 1. d 2. c 3. b 4. b
(B) Because bats use sound to :
- Communicate with each other.
- Get information about their surroundings using their hearing sense.

2 (A) 1. (✓) 2. (✗)
3. (✗) 4. (✗)
(B) The nurse ants send smelly messages to scout ants to alert the ants where to find the food.

3 (A) 1. sight – hearing.
2. summer – low
3. high-pitched
4. bees – smell
(B) 1. b 2. a

4 (A) 1. Blind people cane.
2. Nurse ants.
3. Code. 4. Dots.
(B) 1. b 2. a 3. d

PART 1

UNIT TWO : Matter and Energy

Concept (2.1)

Exercises on Lesson 1

1 1. a 2. c 3. a 4. b
5. d 6. b

2 1. (✗) 2. (✓) 3. (✓) 4. (✗)
5. (✗) 6. (✓) 7. (✓)

3 1. Pulling force.
2. Pushing force.
3. Shockwave truck.

4 1. force 2. move.
3. jet – parachutes
4. rocket. 5. move – stop
6. shockwave – rocket

5 1. Because the shockwave truck has three jet engines.
2. To stop the shockwave truck.

6 1. It starts to move on the ground.
2. It turns into shockwave truck and moves with high speed.
3. The shockwave truck starts to stop gradually.

7 1. (2) – (1)
2. (2) – (1)
3. (2)

Exercises on Lesson 2

1 1. c 2. a 3. a 4. b
5. b 6. c 7. d 8. d
9. d 10. b

2 1. (✓) 2. (✗) 3. (✗) 4. (✓)
5. (✗) 6. (✗) 7. (✓) 8. (✗)

3 1. Pushing force.
2. Pulling force.
3. Motion.
4. Gravity.

4 1. leaves – fire extinguishers
2. speed
3. push – pull
4. pulling
5. balanced
6. pushing
7. motion.
8. gravity.
9. pushing – pulling
10. fixed

5 1. decreasing
2. pushing
3. pulling
4. unbalanced
5. changing

6 1. Due to the pushing force of your leg that acts on it.
2. Because the two forces are balanced, so the object doesn't move.
3. Due to the pulling force of gravity down toward the Earth.
4. Due to the pushing force of his hand against the ball that make it stop.

7 The rope will not move because the two forces are balanced.

8 **1.** It will move faster.
2. 1. (✓) 2. (✗)

9 1. Pushing force.
2. Pulling force.
3. Pulling force.
4. Pushing force.

10 **Answer by yourself.**

Exercises on Lesson 3

1 1. b 2. b 3. b 4. d
5. b 6. b 7. c

2 1. (✓) 2. (✗) 3. (✓) 4. (✗)
5. (✓) 6. (✗)

3 1. gravity 2. pull
3. opposite
4. decreases.
5. friction

4 1. Force. 2. Friction.
3. Friction.

5 1. pulling – pushing
2. balanced
3. pulling – pulling
4. friction 5. gravity.
6. friction – opposite

6 1. Because the wall applied a force to the car with the same amount of the force that pushes the car towards the wall.
2. Due to the friction force between the bicycle tires and the road that act in the opposite direction of the bicycle movement.

7 1. It will fall down on the ground due to the pulling force of gravity.
2. It will move for a certain distance then it starts to stop gradually due to the friction force between the ball and the ground.

8 1. Balanced. 2. Unbalanced.

9 1. d 2. b

Exercises on Lesson 4

1 1. d 2. a 3. c 4. d

2 1. (✓) 2. (✓) 3. (✗) 4. (✗)

3 1. long – short 2. force – larger
3. longer 4. greater
5. longer

4 1. Due to the difference in the forces that act on each of them.
2. Because the small object travels faster than the bigger object when the same amount of force acting on them.

5 The ball that is affected by the greater force will move a longer distance than the other ball.

6 1. Car (A), because it travels a longer distance than car (B)
2. 1. c 2. b 3. d

Exercises on Lesson 5

1 1. c 2. a 3. d 4. a

2 1. (✓) 2. (✗) 3. (✗) 4. (✗)

3 1. energy
2. energy – work
3. energy 4. more

4 The second player, because he raises a weights heavier than the first player, so he need large amount of energy to do more work.

Model Exam on Concept (2.1)

1 (A) 1. c 2. d 3. d 4. b
(B) The rope will not move, so their is no winner team.

2 (A) 1. (✗) 2. (✓)
3. (✗) 4. (✓)
(B) Due to the friction force between the pen and the table surface that act in the opposite direction of the pen movement.

3 (A) 1. increase. 2. force
3. friction 4. more
(B) - Pulling force : 2 – 6
- Pushing force : 1 – 3 – 4 – 5

4 (A) 1. long 2. opposite
3. jet engines
4. balanced
(B) 1. parachute
2. Shockwave truck – rocket.

Concept (2.2)

Exercises on Lesson 1

1 1. a 2. b 3. c 4. a
5. d 6. b 7. d 8. c

2 1. c 2. d 3. a

3 1. (✓) 2. (✗) 3. (✗)

4 1. Kinetic energy.
2. Kinetic energy.

5 1. increases.
2. pulling force
3. Kinetic.
4. pulling force
5. stop.

6 1. electric motor – electricity.
2. less 3. decreases.
4. electrical – kinetic

7 1. Because its stored energy changes into kinetic energy, that helps it moves downward.
2. Because its kinetic energy increases.

8 1. Its stored energy changes into kinetic energy.
2. It can't move,so it will stop.
3. Its stored energy changes into kinetic energy.

9 1. b 2. d 3. c

Exercises on Lesson 2

1 1. b 2. d 3. b 4. b
5. c 6. b

2 1. f 2. d 3. b 4. e
5. c

3 1. (✓) 2. (✗) 3. (✓) 4. (✓)
5. (✓) 6. (✓) 7. (✗) 8. (✓)

4 1. Potential energy.
2. Kinetic energy.
3. Energy. 4. Work.
5. Potential energy.

5 1. kinetic 2. work
3. light 4. kinetic
5. potential

6 1. energy. 2. work.
3. kinetic 4. potential
5. light – sound – thermal
6. potential 7. increase.
8. decrease.

7 1. Because the kinetic energy of the ball transfers to the goal net.
2. Because the bird is found at a height from the Earth's surface, so it has potential energy.
3. Because its height from the Earth's surface increases.

8 1. The object has potential energy.
2. The potential energy of the apple changes into kinetic energy.

3. The potential energy of the book will increase.

9 1. c 2. a

10 1. a 2. b

11 1. potential – kinetic
2. potential

Exercises on Lesson 3

1 1. d 2. c 3. d 4. d
5. c 6. b 7. c 8. c
9. c

2 1. b 2. f 3. d 4. a
5. c

3 1. (✗) 2. (✓) 3. (✓) 4. (✗)
5. (✗) 6. (✗) 7. (✓) 8. (✓)

4 1. Chemical energy.
2. Light energy.
3. Thermal kinetic energy.
4. Gravitational potential energy.

5 1. kinetic.
2. thermal kinetic.
3. decreases 4. sound.
5. potential 6. Gas oven

6 1. gravitational – chemical – sound
2. gravitational 3. kinetic
4. light – sound
5. sound – mechanical
6. electrical – sound
7. light – thermal
8. chemical – thermal
9. potential – kinetic
10. sound – thermal
11. thermal – kinetic
12. electrical – sound – light

7 1. Because it produces light and thermal energies.
2. Because the potential energy which is stored in the spring changes into kinetic energy.

8 1. The electrical energy changes into mechanical energy.
2. The potential energy changes into kinetic energy.
3. The electrical energy changes into light and thermal energies.

9 1. Chemical energy (all items are forms of kinetic energy, while chemical energy is a form of potential energy).
2. Light energy (all items are forms of energy, that can't be seen, while light energy is a form of energy that can be seen).

10 1. a 2. a 3. d

Exercises on Lesson 4

1 1. d 2. d

2 1. b 2. a 3. c

3 1. (✓) 2. (✓) 3. (✓)

4 1. Gasoline.
2. Chemical potential energy.

5 1. The stored chemical energy of food changes into kinetic energy so human can carry out different activities.
2. The stored chemical energy in the battery changes into light and thermal energies.

6 1. Food. 2. Gas oven.
3. Flashlight.

7 1. chemical 2. Electrical
3. Sound

Exercises on Lesson 5

1 1. b 2. d 3. b

2 1. d 2. c 3. a

3 1. (✗) 2. (✗) 3. (✓) 4. (✗)

4 1. Potential energy.
2. Kinetic energy.

5 1. potential – kinetic
2. gravity

Model Exam on Concept (2.2)

1 (A) 1. d 2. c 3. d 4. b
(B) Because each of them produces light and thermal energies.

2 (A) 1. (✗) 2. (✓) 3. (✗) 4. (✓)
(B) 1. chemical
2. Electrical 3. Sound

3 (A) 1. kinetic 2. thermal
3. potential 4. chemical
(B) Its potential energy changes into kinetic energy.

4 (A) 1. Kinetic energy.
2. Electrical energy.
3. Potential energy.
4. Chemical potential energy.
(B) Chemical energy. (all items are forms of kinetic energy, while chemical energy is a form of potential energy).

Concept (2.3)

Exercises on Lesson 1

1 1. c 2. c 3. d 4. b
5. a 6. c 7. b 8. d

2 1. e 2. c 3. d 4. a

3 1. (✗) 2. (✓) 3. (✗) 4. (✓)
5. (✓)

4 1. Wrecking ball. 2. Seatbelt.
3. Airbag. 4. Vents.

5 1. kinetic
2. Wrecking ball.
3. car 4. changes.
5. Airbags 6. thin nylon
7. kinetic energy.

6 1. kinetic – increases.
2. seatbelts – airbags.
3. change. 4. airbag
5. energy 6. energy
7. seatbelt

7 1. Because the kinetic energy of the bat transfers to the ball.
2. Because the seatbelts are used in cars to keep the driver's body and also the passengers from moving forward when the car stops suddenly.
3. Because the airbags slow the speed of the driver moving forward and they absorb the energy of the car due to its collision.

8 1. The kinetic energy of the bat transfers to the ball.
2. The energy of collision will push the driver forward strongly that causes many harms to him.

9 1. d 2. c 3. d

10 1. The car is damaged more than the train. Because the car is slower and lighter than the train and the car has less energy.
2. Airbags inflate automatically.

Exercises on Lesson 2

1 1. b 2. d 3. c 4. d
5. a 6. c 7. c 8. c
9. b

2 1. c 2. e 3. a 4. d

3 1. (✗) 2. (✗) 3. (✓) 4. (✗)
5. (✗) 6. (✗) 7. (✓) 8. (✓)
9. (✗) 10. (✓)

4 1. Collision.
2. Sound energy.
3. Fuel. 4. Speed.

5 1. kinetic 2. kinetic
3. potential. 4. decreases.

6 1. collision.
2. kinetic – sound
3. kinetic 4. more
5. light – sound
6. meters – hours – seconds.
7. 20 8. decrease.

7 1. Because a part of kinetic energy changes into sound energy.
2. Because if the car increases its speed, its kinetic energy increases that results in exerting a large force during an accident.

8 1. The kinetic energy of the car increases.
2. The damage would be much more severe.
3. The speed of the toy car will increase.

9 1. The rabbit has the most kinetic energy. Because the speed of rabbit is more than that of tortoise.
2. decrease.

10 1. c 2. b 3. a

11 $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$

$= \frac{400}{8} = 50$ m/sec.

12 $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$

$= \frac{200}{2} = 100$ km/hr.

Exercises on Lesson 3

1 1. c 2. a 3. a 4. c
5. a 6. b 7. c 8. c

2 1. a 2. d 3. b

3 1. (✗) 2. (✗) 3. (✓)
4. (✗) 5. (✓)

4 1. larger 2. kinetic
3. more 4. Kinetic

5 1. speed – kinetic
2. decrease
3. more
4. more – mass – kinetic
5. kinetic
6. less
7. chemical – kinetic

6 1. Because the truck has more mass than the car.
2. Because the car has a smaller engine than the bus.
3. Because the truck has a bigger mass, than the small car.

7 1. Its kinetic energy will decrease.
2. Its kinetic energy will increase.
3. The damage would be much more severe.
4. The kinetic energy of the truck is more than that of the small car.

9 1. d 2. b 3. c 4.d

Exercises on Lesson 4

1 1. b 2. d 3. c 4. d
5. d 6. c

2 1. b 2. d 3. a

3 1. (✓) 2. (✓) 3. (✗)
4. (✗) 5. (✗)

4 1. decreases.
2. height
3. a large

5 1. increase – decrease.
2. kinetic – angle
3. decrease.
4. less
5. less

6 1. Because the car with mass 3 tons has speed and kinetic energy more than that of the car with mass 1 ton.
2. Because the truck has mass more than that of the car, so the truck has speed and kinetic energy more than that of the car.

7 1. The time that taken to reach the end of ramp will decrease.
2. The speed of the ball will increase.

8 1. Ramp Ⓐ. Because the speed of the truck increases by increasing the angle of the ramp.
2. The truck is faster than the car. Because the mass of the truck is more than that of the car, so the speed of the truck is more than that of the car.
3. The speed of truck will increase.

9 1. (✓) 2. (✗) 3. (✓)

Exercises on Lesson 5

1 1. c 2. d 3. b 4. b
5. b 6. b 7. d

2 1. b 2. d 3. c

3 1. (✗) 2. (✓) 3. (✓) 4. (✗).

4 1. decreases 2. decreases
3. equal to 4. thermal

5 1. potential – kinetic
2. kinetic
3. kinetic – sound
4. kinetic – thermal – friction
5. friction – kinetic
6. potential – kinetic
7. kinetic – stop

6 1. Because some of the kinetic energy changes into sound energy during collision.
2. Because the energy is conserved during the collision, so it cannot be destroyed.

7 1. It stores potential energy and doesn't have any kinetic energy.
2. The potential energy changes into kinetic energy.
3. Some of kinetic energy changes into thermal energy.

8 (1) Rise up the first ball, ...
(2) Potential energy of the first ball decreases ....
(3) Kinetic energy is transferred from the first ball ....
(4) Kinetic energy of all balls decreases ....

9 1. c 2. b 3. a

Model Exam on Concept (2.3)

1 (A) 1. d 2. c 3. a 4. c
(B) Because the kinetic energy of the bat transfers to the ball.

2 (A) 1. (✓) 2. (✗)
3. (✓) 4. (✓)
(B) The damage would be much more severe.

3 (A) 1. kinetic energy.
2. height 3. equal
4. increases.
(B) (1) Rise up the first ball, ...
(2) Potential energy of the first ball ....
(3) Kinetic energy is transferred from the first ball ....
(4) Kinetic energy of all balls decreases ....

4 (A) 1. Wrecking ball.
2. Collision. 3. Vents.
4. Sound energy.
(B) The car causes less damage.

Part 2

Guide Answers of Self-Assessments



PART 2

UNIT ONE : Living Systems

Concept (1.1)

Self-Assessment 1

1 (A) 1. b 2. b 3. a

(B) To hide from their predators or preys as the colorful scales make them hard to be seen among the rocks.

2 (A) 1. (✗) 2. (✓) 3. (✗)

(B) They will be very hard for forest bears to hide and hunt their preys in the forest habitat.

3 1. Figure (b)

2. The blood in the penguin's feet will be very cold so, the penguin cannot walk on ice for a long time and its toes may freeze.

Self-Assessment 2

1 (A) 1. structural – behavioral

2. behavioral – structural

3. tan – white

(B) It cannot sneak up on its prey by camouflage.

2 (A) 1. short

2. salt water and fresh water.

3. reptiles

(B) 1. Behavioral adaptation.

2. Camouflage.

3. Structural adaptation.

3 1. - arctic fox in summer.

- sneak up on its prey in summer season.

2. - forest bear.

- hide among the trees when it hunts.

Self-Assessment 3

1 (A) 1. a 2. c 3. b

(B) To prevent the plant from the loss of water.

2 (A) 1. acacia – fennec fox

2. snow – rainforest

3. arctic – penguin

(B) Acacia tree and kapok tree.

3 1. Starred agama lizard and fennec fox.

2. Palm tree and barbary fig plant.

3. 1. (✓) 2. (✗)

Self-Assessment 4

1 (A) 1. d 2. a 3. d

(B) Because it moistens food and begins to break it down.

2 (A) 1. (✗) 2. (✓) 3. (✗)

(B) Nutrients will not be absorbed and will not be carried to all the body parts.

3 1. trachea. 2. esophagus.
3. lungs. 4. stomach.
5. respiratory – digestive

Self-Assessment 5

1 (A) 1. c 2. c 3. b

(B) Because humans breathe in air, and need clean water to drink, while fish need clean water to breathe.

2 (A) 1. (✗) 2. (✗) 3. (✓)

(B) 1. • Animal → Starred agama lizard
• Plant → Barbary fig
2. • Animal → Panther chameleon
• Plant → Kapok tree
3. • Animal → Penguin
• Plant → Pine tree
4. • Animal → Bull shark
• Plant → Mangrove tree

3 1. It has a very long trunk, so most animals except giraffe cannot reach its leaves to feed on.
2. They have gills to breathe under water.
3. It has white fur helps it blend in with the snow as it sneaks up on its prey.

Self-Assessment 6

1 (A) 1. Starred agama lizard (all items are amphibians, while starred agama lizard is a reptile).
2. Palm tree (all items live in water environment, while palm tree lives in desert environment).
3. Acacia tree (all items live in rainforests, while acacia tree lives in savannah forest).

(B) Because their numbers were decreased in the last few years.

2 (A) 1. Frog. 2. Skin.
3. Savannah forest.

(B) d. removing water from ponds and streams. Because wet environment is the natural habitat, where amphibians can extract oxygen gas directly from water through skin.

3 1. Habitat (A) 2. Habitat (B)
3. Habitat (A) 4. Habitat (A)
5. Habitat (B) 6. Habitat (B)
7. Habitat (A) 8. Habitat (A)
9. Habitat (A) and habitat (B)
10. Habitat (B)

Model Exam on Concept (1.1)

1 (A) 1. cool 2. expands
3. mild
4. blood vessels

(B) Because starred agama lizard belongs to reptiles, while golden frog belongs to amphibians.

2 (A) 1. (B) 2. (S)
3. (B) 4. (S)

(B) The digestive system could not do its function correctly.

3 (A) 1. b → A 2. c → B
3. a → C

(B) 1. Alveoli.
2. Arctic fox.

4 (A) 1. b 2. c
3. b 4. a

(B) 1. structural
2. Esophagus

Concept (1.2)

Self-Assessment 7

1 (A) 1. survive – search for food.
2. sight – hearing
3. eyes – tongue

(B) Because they use ecolocation to locate their preys under water.

2 (A) 1. (✗) 2. (✓) 3. (✓)

(B) 1. sight, smell and taste.
2. Taste, tongue.

3 1. a 2. b 3. d 4. c

Self-Assessment 8

1 (A) 1. c 2. c 3. d

(B) To connect the sensory organs with the brain.

2 (A) 1. (✓) 2. (✓) 3. (✗)

(B) .... ears .... brain .... electrical ....

3 1. Bats 2. Snakes
3. Owls 4. Dolphins

Self-Assessment 9

1 (A) 1. c 2. a 3. d

(B) It cannot jump for long distances to run away from its enemies.

2 (A) 1. fast. 2. hearing. 3. nervous
(B) Because they have a sharp sense of hearing that help it to survive under water.

3 1. (1) – (2) 2. (2) – (1) 3. (1) – (2)

Self-Assessment 10

1 (A) 1. c 2. d 3. b
(B) Running when I see the wild animal coming towards me, because the brain can process what I see faster than what I hear.

2 (A) 1. Reaction time.
2. Electrical impulses.
3. Sensory receptors.
(B) The sensory receptors in the ears of the deer send a message to the brain telling it that there is a danger, then the brain processes this message and sends message to the legs of the deer to start running away to escape from the hunter.

3 1. The rabbit saw a fox ......
2. The rabbit's nerves ......
3. The rabbit's brain processes ......
4. The rabbit's brain sent a signal ......

Self-Assessment 11

1 (A) 1. c 2. d 3. b
(B) Because owl has bowl-shaped face and feathers in its head.

2 (A) 1. structural
2. brain
3. heat
(B) ①, ③, ④ and ⑥.

3 1. (✓) 2. (–) 3. (✓)
4. (✓) 5. (–) 6. (✓)

Type of adaptation	Sentence number
1. Structural adaptation :	(1), (3), (6)
2. Behavioral adaptation :	(4)

Model Exam on Concepts (1.1) & (1.2)

1 (A) 1. b 2. b 3. d 4. c
(B) It cannot cool its body.

2 (A) 1. (✓) 2. (✗) 3. (✗) 4. (✓)
(B) 1. Small intestine (All items belong to the nervous system, while small intestine belongs to the digestive system).
2. Diaphragm (All items belong to the digestive system, while diaphragm belongs to the respiratory system).

3 (A) 1. c – B 2. a – D 3. d – A 4. b – C
(B) Because it transfers messages between the brain and body parts.

4 (A) 1. reflex. 2. oxygen gas 3. penguin 4. reaction time.
(B) 1. gills 2. brain

Concept (1.3)

Self-Assessment 12

1 (A) 1. (✓) 2. (✗) 3. (✓)
(B) Because it has a mirror-like membrane on the back of its eye that bounces off the light.

2 (A) 1. b 2. d 3. c
(B) ..... sight ..... hearing ..... stronger .....

3 1. d 2. d 3. c 4. d

Self-Assessment 13

1 (A) 1. c 2. d 3. b
(B) He can see in the weakest light levels.

2 (A) 1. (✓) 2. (✓) 3. (✓)
(B) Because nocturnal animals have bigger eyes which are more sensitive to light than humans and their pupils usually open wider than humans.

3 1. Fishing cat. 2. Dolphin. 3. Tarsier. 4. Owl. 5. Bat.

Self-Assessment 14

1 (A) 1. a 2. c 3. c
(B) Because it reflects the light rays like a mirror.

2 (A) 1. (✓) 2. (✗) 3. (✗)
(B) 1. Snake (all items are animals that have super sense of sight, while snake is not).
2. Bat (all items are animals that have a tapetum lucidum in their eyes, while bat is not).

3 1. b 2. c 3. b

Self-Assessment 15

1 (A) 1. (✓) 2. (✗) 3. (✗)

(B) Because it considered as a transparent object that allows light to pass through.

2 (A) 1. d 2. c 3. a

(B) 1. Mirror (all items are rough surfaces, while mirror is smooth surface).

2. Glass cup (all items are opaque objects, while glass cup is transparent object).

3 1. Yes. 2. b

Self-Assessment 16

1 (A) 1. reflects 2. small

3. one – same

(B) Light can't pass through the opaque object to the wall, so shadow of object is formed on the wall.

2 (A) 1. (✗) 2. (✗) 3. (✓)

(B) To allow more light enters the cats eyes.

3 1. Mirror. 2. Glass.

3. Wood. 4. Plastic.

Self-Assessment 17

1 (A) 1. (✓) 2. (✗) 3. (✓)

(B) Fishing cats eyes don't glow and they don't have excellent night vision, so they can't hunt in the dark.

2 (A) 1. Brain.

2. Fishing cats.

3. Rough surface.

(B) Because it has a strong sense of hearing by using echolocation property.

3 1. c 2. a 3. b 4. b

Model Exam on Concepts (1.1), (1.2) & (1.3)

1 (A) 1. Chameleon.

2. Fishing cat.

3. Owl. 4. Human.

(B) Because it contracts and moves down during inhalation to increase the size of chest, while it relaxes and moves up during exhalation to decrease the size of chest.

2 (A) 1. d 2. e 3. c 4. a

(B) It cannot adapt with the very cold weather in polar regions, so it may die.

3 (A) 1. c 2. b 3. d

(B) 1. (✓) 2. (✗) 3. (✓)

4 (A) 1. Night vision goggles.

2. Adaptation.

3. Reaction time.

4. Opaque objects.

(B) 1. nervous

2. bigger

Concept (1.4)

Self-Assessment 18

1 (A) 1. (✗) 2. (✗) 3. (✓)

(B) Because they use their wings to form different flash patterns to warn off predators or to attract a mate to reproduce.

2 (A) 1. behavioral

2. humans.

3. sight.

(B) By producing a chemical reaction inside their bodies.

3 1. d 2. d 3. b 4. c

Self-Assessment 19

1 (A) 1. c 2. b 3. d

(B) Because low-pitched sounds travel better through warm water.

2 (A) 1. (✗) 2. (✓) 3. (✓)

(B) Dolphins and humpback whales.

3 1. Winter songs have high-pitched sounds, while summer songs have low-pitched sounds.

2. a) No.

b) Oxygen gas.

Self-Assessment 20

1 (A) 1. hearing – sight.

2. hearing

3. light

(B) Humpback whales start producing high-pitched sounds because this type of sounds travels better through cold water to communicate with each other.

2 (A) 1. dots

2. mating

3. hearing

(B) Light energy and sound energy.

3 1.

R	A	M	Y
•−−•	•−	−−	−•−−

2. Answer by yourself.

Self-Assessment 21

1 (A) 1. c 2. d 3. a
(B) Because they use mirrors to attract the attention of rescue helicopters.

2 (A) 1. Writing.
2. Honeybee.
3. Code.
(B) Fireflies and honeybees.

3 a. The child
b. The mother
c. The father

Self-Assessment 22

1 (A) 1. high
2. hearing – sight
3. sound
(B) To communicate over distances of many kilometers.

2 (A) 1. (✗) 2. (✗) 3. (✓)
(B) Ants and acacia trees.

3 1. (1) 2. (2)
3. (2) 4. (1)

Model Exam on Theme (1)

1 (A) 1. d 2. b 3. d 4. b
(B) The blood in the penguin's feet will be very cold, so the penguin cannot walk on ice for a long time and its toes may freeze.

2 (A) 1. (✗) 2. (✓)
3. (✓) 4. (✗)
(B) 1. Mangrove tree (All items live in desert habitat, while mangrove tree lives in salt water habitat).
2. Lungs (All items belong to the nervous system, while lungs belong to the respiratory system).

3 (A) 1. tarsiers
2. flashing pattern
3. carbon dioxide gas
4. dolphins
(B) Because they enable fish to extract oxygen gas from water for respiration.

4 (A) 1. Snake.
2. Light.
3. Summer season.
4. Diaphragm.
(B) Yellow color of jerboa allows it hides easily in sandy environment, so it can sneak up on its prey and hide easily from its enemies.

PART 2

UNIT Two : Matter and Energy

Concept (2.1)

Self-Assessment 23

1 (A) 1. (✗) 2. (✓) 3. (✓)
(B) To stop their movement.

2 (A) 1. b 2. d 3. a
(B) The shockwave truck, because it has three jet engines that make it faster than the normal truck.

3 1. Shockwave truck.
2. It will move with a slower speed.

Self-Assessment 24

1 (A) 1. a 2. b 3. a
(B) This team will win the game, because the rope will move toward the team of greater pulling force.

2 (A) 1. parachutes.
2. greater
3. pushing
(B) Because by increasing the number of fire extinguishers, the speed of the cart will increase.

3 1. a 2. b 3. a

Self-Assessment 25

1 (A) 1. pushing force of table – pulling force of gravity.
2. balanced.
3. friction
(B) Due to the effect of pulling force of gravity down toward the Earth.

2 (A) 1. (✗) 2. (✓) 3. (✗)
(B) Friction force of air and friction force between the car tires and the road.

3 (A) 1. (✗) 2. (✓) 3. (✓)
(B) 1 – 2

Self-Assessment 26

1 (A) 1. b 2. d 3. a
(B) Due to the friction force between the ball and the ground that acts in the opposite direction of ball movement.

2 (A) 1. Pulling force.
2. Force of gravity.
3. Jet engine.
(B) The car travels a distance longer than the truck.

3 1. pushing 2. ground – air
3. decreases 4. longer
5. pushing

Self-Assessment 27

1 (A) 1. a 2. a 3. b

(B) Because their is a friction force between the moving body and the ground that acts in the opposite direction of the body movement.

2 (A) 1. equal to 2. equal to 3. shorter

(B) Because car (B) is smaller than car (A), so it travels a distance longer than car (A).

3 (A) 1. ③ and ④
2. ① and ②
3. Friction.

(B) 1. (✗) 2. (✓) 3. (✓)

Model Exam on Concept (2.1)

1 (A) 1. b 2. d 3. b 4. d

(B) The shockwave truck starts to stop gradually.

2 (A) 1. (✗) 2. (✓) 3. (✓) 4. (✗)

(B) Due to the help of powerful three jet engines.

3 (A) 1. energy 2. longer
3. pulling – pulling
4. fixed

(B) Car (A), because it travels a longer distance than car (B).

4 (A) 1. Pulling force.
2. Pushing force.
3. Force. 4. Friction.

(B) It will move faster.

Concept (2.2)

Self-Assessment 28

1 (A) 1. c 2. d 3. b

(B) The stored potential energy in the train is changed into kinetic energy.

2 (A) 1. (✗) 2. (✗) 3. (✓)

(B) Because his stored potential energy changes into kinetic energy.

3 1. ① – ②
2. ② – ③
3. kinetic – increase

Self-Assessment 29

1 (A) 1. d 2. c 3. d

(B) Because its height from the Earth's surface will increase.

2 (A) 1. (✗) 2. (✓) 3. (✓)

(B) Its potential energy changes into kinetic energy.

3 1. a 2. d 3. d 4. c

Self-Assessment 30

1 (A) 1. c 2. c 3. b

(B) Because the battery stores chemical potential energy, while a ball at the top of hill stores gravitational potential energy.

2 (A) 1. (✗) 2. (✗) 3. (✗)

(B) Its potential energy changes into kinetic energy.

3 1. a 2. c 3. a

Self-Assessment 31

1 1. b 2. c 3. c

2 (A) 1. (✓) 2. (✗)

(B) 1. b 2. c 3. d 4. a

3 1. c 2. a 3. b

Self-Assessment 32

1 1. b 2. d 3. b

2 Its potential energy changes into kinetic energy.

3 1. c 2. b 3. d

Model Exam on Concepts (2.1) & (2.2)

1 (A) 1. a 2. c 3. b 4. d

(B) His potential energy changes into kinetic energy.

2 (A) 1. (✗) 2. (✗) 3. (✓) 4. (✓)

(B) Because burning of food produces kinetic energy to carry out different activities.

3 (A) 1. potential 2. work
3. gravity. 4. long

(B) 1. Shockwave truck.
2. It cannot stop easily.

4 (A) 1. Shockwave truck.
2. Friction force.
3. Kinetic energy.
4. Sound energy.

(B) c

Concept (2.3)

Self-Assessment 33

1 (A) 1. d 2. c 3. d

(B) To allow the driver to get out of the car.

2 (A) 1. (✓) 2. (✓) 3. (✗)

(B) The airbags will inflate and fill with a gas.

3 ...... kinetic ...... different ...... bicycle ...... car.

Self-Assessment 34

1 (A) 1. b 2. a 3. c

(B) Speed = $\frac{\text{Distance}}{\text{Time}}$

$= \frac{240}{4} = 60$ km/hr.

2 (A) 1. (✗) 2. (✗) 3. (✓)

(B) Its kinetic energy will increase.

3 1. c 2. b 3. c 4. b

Self-Assessment 35

1 (A) 1. c 2. c 3. d

(B) Because the vehicle with the large mass has more kinetic energy than that of the vehicle with the small mass, so it causes more damage.

2 (A) 1. (✗) 2. (✓) 3. (✓)

(B) Its kinetic energy will increase.

3 1. b 2. a 3. c

Self-Assessment 36

1 (A) 1. d 2. a 3. c

(B) Because the speed of the object that moves down a ramp increases by increasing the angle of the ramp.

2 (A) 1. (✗) 2. (✓) 3. (✓)

(B) Its kinetic energy will increase.

3 1. b 2. d 3. a 4. b

Self-Assessment 37

1 (A) 1. c 2. d 3. c

(B) Because some of kinetic energy of balls changes into sound energy.

2 (A) 1. (✗) 2. (✓) 3. (✓)

(B) Their kinetic energy will decrease gradually until they stop.

3 1. b 2. d

Model Exam on Theme (2)

1 (A) 1. c 2. b 3. d 4. c

(B) 1. Due to the help of three jet engines.

2. Because its stored energy changes into kinetic energy, that helps it moves downward.

2 (A) 1. (✗) 2. (✗) 3. (✓) 4. (✓)

(B) The energy of collision will push the driver forward strongly that causes many harms to him.

3 (A) 1. Pushing force.

2. Kinetic energy.

3. Speed. 4. Seatbelts.

(B) Chemical energy (all items are forms of kinetic energy except chemical energy which is a form of potential energy.

4 (A) 1. kinetic.

2. decreases.

3. energy

4. chemical

(B) The speed of the train

$$= \frac{\text{Distance}}{\text{Time}} = \frac{240}{3} = 80 \text{ km/hr.}$$



Part 3

Guide Answers of Final Examinations

PART 3

Model Examinations

El-Moasser Final Examination Models

Model Exam 1

1 (A) 1. b 2. c 3. d
4. c
(B) To prevent the driver and passengers from moving forward when the car suddenly stops.

2 (A) 1. (✗) 2. (✓) 3. (✓)
4. (✗)
(B) The kinetic energy will increase.

3 (A) 1. decreases. 2. nose
3. increase
4. kinetic – sound
(B) Pulling force : 2 – 6
Pushing force : 1 – 3 – 4 – 5

4 (A) 1. Trunk. 2. Nerves.
3. Friction force.
4. hour or second
(B) speed = $\frac{\text{Distance}}{\text{Time}}$
$= \frac{300}{30} = 10$ m/sec.

Model Exam 2

1 (A) 1. parachutes
2. kinetic
3. electrical – sound
4. light – sound
(B) Due to the pushing force of his hand against the ball that stops it.

2 (A) 1. c 2. b 3. c
4. d
(B) Light is reflected in different directions.

3 (A) 1. cars
2. thermal energy.
3. sharp 4. tires
(B)

Opaque objects	Transparent objects
• Wood. • Metal.	• Air. • Water. • Lenses.

4 (A) 1. Nurse ants. 2. Gravity.
3. Needle leaves.
4. Nose.
(B) Speed = $\frac{\text{Distance}}{\text{Time}}$
$= \frac{160}{2} = 80$ km/hr.

Model Exam 3

1 (A) 1. c 2. d 3. b
4. b
(B) Because the mirror has more smooth surface than the painted surface.

2 (A) 1. (✗) 2. (✓)
3. (✓) 4. (✓)
(B) Speed = $\frac{\text{Distance}}{\text{Time}}$
$= \frac{240}{3} = 80$ km/hr.

3 (A) 1. Sense organs.
2. Vents or Holes.
3. Rough surface.
4. Diaphragm.
(B)

Organisms live in deserts	Organisms live in forests
– Starred agama lizard. – Fennec fox. – Palm tree. – Barbary fig plant.	– Panther chameleon. – Kapok tree.

4 (A) 1. esophagus – stomach
2. trachea
(B)

Points of comparison	Inhalation	Exhalation
1. Diaphragm movement :	Downward	Upward
2. Size of chest cavity :	Increases	Decreases
3. The air is rich in :	Oxygen gas	Carbon dioxide gas

Model Exam 4

1 (A) 1. Camouflage.
2. Nervous system.
3. Electrical energy.
4. Work.
(B) The Sun (or candle .... etc.).

2 (A) 1. c 2. a 3. d
4. d
(B) The ecosystem still clean without pollution.

3 (A) 1. unbalanced
2. sound
3. Kinetic energy
4. nervous system.
(B) Speed = $\frac{\text{Distance}}{\text{Time}}$
$= \frac{200}{5} = 40$ m/sec.

4 (A) 1. ears – brain
2. smell – movement
3. decrease.
(B)

Points of comparison	Polar bear	Forest bear
1. Habitat :	Polar habitat.	Forest habitat.
2. Fur color :	White.	Black or brown.

Model Exam 5

1 (A) 1. b 2. a 3. b
4. d
(B) It cannot reach to underground water in dry season, and cannot survived.

2 (A) 1. (✓) 2. (✗) 3. (✓)
4. (✓)
(B) 1. Balanced.
2. Unbalanced.

3 (A) 1. Fennec foxes.
2. Gravity.
3. Airbags.
4. Mangorove tree.

(B) To be away from animals that eat its leaves.

4 (A) 1. Changing
2. pulling
3. Airbags
4. pulling force

(B) 1. nervous
2. (2) – (3) – (1)

Model Exam 6

1 (A) 1. b 2. d 3. b 4. a

(B) Because camouflage helps some animals hide from their predators or preys in different environments.

2 (A) 1. (✗) 2. (✗) 3. (✗) 4. (✓)

(B) – Animals have super sight sense : Tarsier – Fishing cat.
– Animals have super hearing sense : Bat – Dolphin.

3 (A) 1. Small intestine.
2. Countershading.
3. Energy.
4. Tongue.

(B) Speed = $\frac{Distance}{Time}$

$= \frac{150}{5} = 30$ m/sec.

4 (A) 1. potential energy.
2. potential energy
3. kinetic energy.
4. kinetic energy

(B) 1. Figure (a)
2. Figure (b)
3. diaphragm – increases
4. carbon dioxide

Model Exam 7

1 (A) 1. b 2. d 3. d 4. d

(B) Some of kinetic energy is changed into thermal energy.

2 (A) 1. penguin – polar bear.
2. electrical – light – sound.
3. energy
4. hearing – bats – dolphins.

(B) 1. c ⟶ B
2. a ⟶ D
3. d ⟶ A
4. b ⟶ C

3 (A) 1. (✓) 2. (✗) 3. (✓) 4. (✗)

(B) Speed = $\frac{Distance}{Time} = \frac{250}{5}$

= 50 m/sec.

4 (A) 1. Respiration process.

2. Panther chameleon.
3. Fuel.
4. Chemical energy.

(B) Because polluted air causes harm to the respiratory system.

Model Exam 8

1 (A) 1. (✗) 2. (✓) 3. (✓) 4. (✓)

(B) Because speed = $\frac{Distance}{Time}$

2 (A) 1. b 2. b 3. c 4. b

(B) Speed = $\frac{Distance}{Time}$

$= \frac{220}{2} = 110$ km/hr.

3 (A) 1. increases.
2. Water
3. stronger
5. different

(B) The nurse ants send smelly messages to scout ants that alert other ants where to find the food.

4 (A) 1. The Moon (All items are sources of light, while the Moon reflects the light).
2. Fireflies (All items use echolocation property, while fireflies cannot use echolocation property).
3. Bull shark (All items live on land, while bull shark lives in water).
4. Flashlight (All items produce sound energy, while flashlight produces light energy).

(B) 1. parachute.
2. shockwave truck.

Model Exam 9

1 (A) 1. wings – code
2. (B) – (A)
3. lungs
4. airbags – seatbelts.

(B) Due to the difference in the forces that act on them.

2 (A) 1. (✗) 2. (✓) 3. (✓) 4. (✗)

(B) Speed = $\frac{Distance}{Time}$

$= \frac{400}{20} = 20$ m/sec.

3 (A) 1. The soldier ants.
2. Penguin.
3. Light.
4. Nervous system.

(B) They cannot communicate with each other or locate the objects around them by the sense of hearing.

4 (A) 1. d 2. d
3. c 4. c

(B)

Types of communication	The used senses
1. Watching TV.	- Sight and hearing.
2. Flashing lights of fireflies.	- Sight.
3. Echolocation in dolphins.	- Hearing.
4. Using the cell phone.	- Sight and hearing.

Model Exam 10

1 (A) 1. c 2. a
3. d 4. c

(B) Because it transfers messages between the brain and body parts.

2 (A) 1. energy
2. bat – dolphin
3. kinetic 4. kinetic

(B) Speed = $\frac{\text{Distance}}{\text{Time}}$

$= \frac{100}{2} = 50$ km/hr.

3 (A) 1. e 2. d 3. a
4. b 5. c

(B) It will fall down on the ground due to the pulling force of gravity.

4 (A) 1. (✓) 2. (✓) 3. (✗)
4. (✓)

(B) 1. (1), (3) 2. (4)
3. (2)

Final Examination of Some Governorates

Cairo Governorate

1 Nasr City Edu. Zone

1 1. (✗) 2. (✗) 3. (✓) 4. (✓)

2 1. the brain 2. echolocation
3. nervous 4. esophagus.

3 1. a 2. a 3. d 4. c

4 (A) Because dolphin use echolocation as it has a strong sense of hearing.

(B) Snake

2 Heliopolis Edu. Zone

1 1. b 2. a 3. d
4. d 5. a

2 1. (✓) 2. (✗) 3. (✗)
4. (✓) 5. (✗)

3 (A) 1. Kinetic energy.
2. Kilometer.
3. Camouflage.

(B) 1. Dogs live in cold environment have thick fur, to keep their bodies warm.
2. The Sun and a candle.

3 El-Sahel Edu. Zone

1 1. a 2. c 3. c
4. a 5. c

2 1. (✗) 2. (✓) 3. (✗)
4. (✓) 5. (✗)

3 (A) 1. b 2. c 3. e
4. a

(B) Speed = $\frac{\text{Distance}}{\text{Time}}$

$= \frac{150}{10} = 15$ m/sec.

4 El-Zeitoun Edu. Zone

1 1. a 2. b 3. c 4. a

2 1. (✗) 2. (✗) 3. (✓) 4. (✓)

3 (A) 1. c 2. a
(B) 1. b 2. c 3. e 4. a

4 1. respiratory 2. rough
3. structural

5 (A) using codes.
(B) Because dolphin use echolocation as it has a strong sense of hearing.

Giza Governorate

5 North Giza Edu. Zone

1 1. carton
2. from the sensory organs to the brain.
3. consumes 4. chemical

2 1. a 2. d 3. c 4. b

3 1. (✗) 2. (✓) 3. (✓)

4 (A) Speed = $\frac{\text{Distance}}{\text{Time}}$

$= \frac{600}{6} = 100$ km/hr.

(B) Figure (A), because the wooden spoon is a rough surface, so it reflects light in different directions.

5 1. b 2. c 3. e 4. a

6 6th of October Edu. Zone

1 1. a 2. c 3. d
4. a 5. d

2 1. (✗) 2. (✓) 3. (✗)
4. (✓) 5. (✓)

3 (A) 1. $\frac{\text{Distance}}{\text{Time}}$ 2. gills
3. mirror. 4. The Sun

(B) Dogs live in cold environment have thick fur, to keep their body warm.

Alexandria Governorate

7 El-Agamy Edu. Zone

1 1. c 2. a 3. c
4. a 5. c

2 1. (✓) 2. (✗) 3. (✓) 4. (✓)

3 1. b 2. c

4 (A) 1. codes.
2. carbon dioxide
(B) 1. Figure (a).
2. Figure (b).

El-Qualyoubia Governorate

8 Obour Edu. Zone

1 1. d 2. a 3. c 4. a
5. d 6. a 7. a

2 1. (✓) 2. (✗) 3. (✓)

3 1. c 2. a

4 1. Pollution 2. $\frac{\text{Distance}}{\text{Time}}$

5 Structural adaptation.

El-Sharkia Governorate

9 Al-Hessinia Edu. Zone

1 1. a 2. b 3. c

2 1. (✗) 2. (✓) 3. (✓)

3 1. c 2. a 3. b

4 1. reaction time.
2. sound 3. energy.

5 (A) 1. Because dolphin use echolocation as it has a strong sense of hearing.
2. Gravity pulling force.
(B) To absorb a large amount of sunlight.

El-Gharbia Governorate

10 El-Santa Edu. Zone

1 1. a 2. b 3. b

2 1. c 2. a 3. b

3 1. (✓) 2. (✗) 3. (✓)

4 (A) Car (B) has the higher speed.

(B) Speed = $\frac{\text{Distance}}{\text{Time}}$

$= \frac{600}{6} = 100$ km/hr.

5 1. Carton. 2. Eye.
3. reaction time.

Kafr El-Sheikh Governorate

11 Al-Hamoul Edu. Zone

1 1. b 2. d 3. a
4. d 5. a

2 1. (✗) 2. (✓) 3. (✓)
4. (✓) 5. (✗)

3 1. b 2. a

4 1. Wood 2. Ear
3. Mangrove

Al-Behira Governorate

12 Abou-Homous Edu. Zone

1 1. c 2. a 3. a 4. c

2 1. (✗) 2. (✗) 3. (✗) 4. (✓)

3 1. 5 km/hr. 2. Nerves.
3. Chemical energy.
4. gravity

4 1. b 2. c

Beni-Suef Governorate

13 Beba Edu. Zone

1 1. d 2. c 3. a
4. a 5. d

2 1. (✓) 2. (✓) 3. (✗)
4. (✓) 5. (✓)

3 1. d 2. b 3. a
4. e 5. c

Assiut Governorate

14 Assiut Edu. Zone

1 1. a 2. b 3. d
4. a 5. a

2 (A) 1. (✗) 2. (✗)
3. (✗) 4. (✓)

(B) Speed = $\frac{\text{Distance}}{\text{Time}}$

$= \frac{600}{6} = 100$ km/hr.

3 (A) 1. d 2. a 3. b
(B) potential – kinetic.

Sohag Governorate

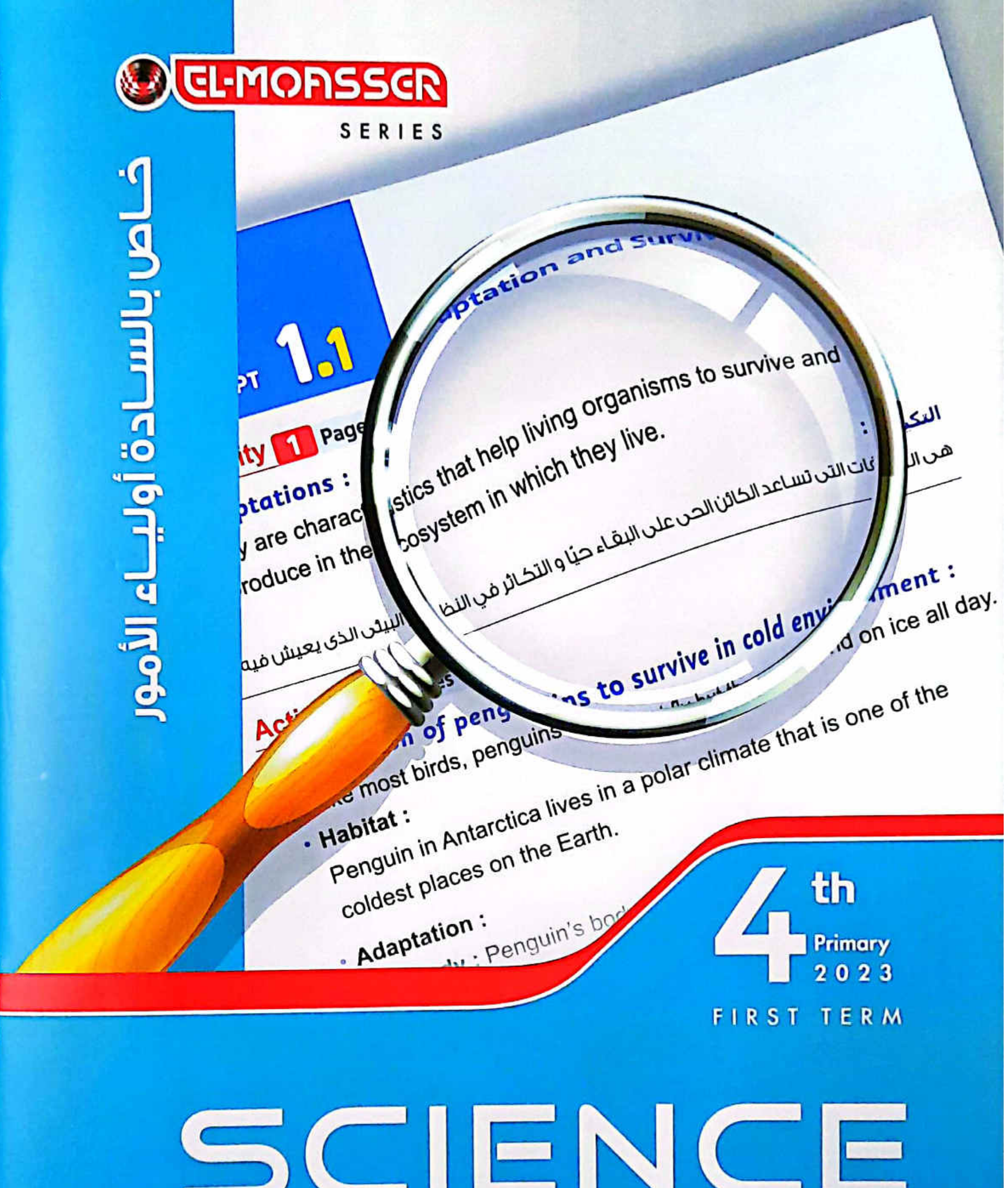
15 Sohag Edu. Zone

1 1. carton 2. work
3. ear 4. hearing sense
5. pollution 6. Teeth and tongue

2 1. (✗) 2. (✓) 3. (✗)
4. (✗) 5. (✓)

3 1. A small car
2. Gravity pulling force.





SCIENCE

الجـــزء الخـــاص بالترجـــمة

By A Group of Supervisors



- حرصًا منا على مساعدة حضراتكم فى فهم مادة Science بطريقة مبسطة حتى يتسنى لكم مساعدة أبنائكم فى فهم واستيعاب المادة العلمية، قمنا بإعداد هذا الجزء الخاص بترجمة الأجزاء التى تحتاج إلى إيضاح باللغة العربية.

- ونحن إذ نقدم هذا الكتيب المترجم للسادة أولياء الأمور، ننصح بعدم اعتماد الطفل عليه أثناء المذاكرة، وذلك لضرورة أن يتدرب الطفل على فهم المادة باللغة الإنجليزية والتى هى لغة دراسته كما أنها لغة الامتحان النهائى.

والله ولى التوفيق

المؤلفون



Concept 1.1 Adaptation and Survival

Activity 1 Page 17

Adaptations :

They are characteristics that help living organisms to survive and reproduce in the ecosystem in which they live.

التكيف :

هى الصفات التى تساعد الكائن الحى على البقاء حيًا والتكاثر فى النظام البيئى الذى يعيش فيه.

Activity 2 Pages 18 , 19

- Adaptation of penguins to survive in cold environment :

Unlike most birds, penguins cannot fly but they can stand on ice all day.

- **Habitat :**

  Penguin in Antarctica lives in a polar climate that is one of the coldest places on the Earth.

- **Adaptation :**
  - **Its body :** Penguin's body is covered with dense feathers and a thick layer of fat to keep its body warm.
  - **Its feet :** Penguin's feet have no feathers.

- تكيف البطريق للعيش فى البيئة الباردة :

طائر البطريق ليس مثل معظم الطيور، فهو لا يمكنه الطير ولكنه يستطيع الوقوف على الثلج طوال اليوم.

- **الموطن :** يعيش البطريق فى مناخ قطبى فى القارة القطبية الجنوبية وهى أحد أبرد المناطق على الأرض.

- **التكيف :**
  - **جسمه :** جسم البطريق مغطى بريش كثيف وطبقة سميكة من الدهون لتحافظ على جسم البطريق دافئًا.
  - **أقدامه :** أقدام البطريق لا يوجد بها ريش.

- How do the penguin's feet stay warm ?

- Blood vessels bring cold blood up from the feet.
- Other blood vessels bring warm blood down to the feet from the feather-coated body.
- These vessels weave around each other. When they touch, the warm blood vessels heat up the cold blood vessels, so the heat transfers to the penguin's feet.

- كيف لأقدام البطريق أن تبقى دافئة ؟

- تحمل الأوعية الدموية الدم البارد من أرجل البطريق لأعلى.
- تحمل أوعية دموية أخرى دمًا دافئًا لأسفل من جسم البطريق المغطى بالريش إلى أرجله.
- تلتف هذه الأوعية الدموية حول بعضها البعض، وعندما تتلامس فإن الأوعية الدموية التى بها دم دافىء تقوم بتدفئة الأوعية الدموية التى تحمل دم بارد، وبالتالى تنتقل الحرارة إلى أرجل البطريق.

Activity 3 Pages 20 & 21

❶ Polar bear :

- **Habitat :** Arctic region (polar region).
- **Adaptation :** It has white and thick fur :
  - Its white fur helps it blend in with the snow as it sneaks up on its prey.
  - Its thick fur helps it stay warm in its cold arctic region.

❶ الدب القطبى :

- **الموطن :** القطب الشمالى [منطقة قطبية].
- **التكيف :**
  لديه فراء أبيض كثيف :
  - فراءه الأبيض يمكنه من التخفى بين الثلوج والانقضاض على فريسته.
  - فراءه الكثيف يساعده على البقاء دافئًا فى القطب الشمالى البارد.

❷ Brown bear and black bear :

- **Habitat :** Forests.
- **Adaptation :** They have dark fur to help them hide among the trees when they hunt.

❷ الدببة البنية والسوداء :

- **الموطن :** الغابات.
- **التكيف :** لها فراء داكن يساعدها على التخفى بين الأشجار للصيد.

❸ Caracal and fennec fox :

- **Habitat :** Desert.
- **Adaptation :** They have sandy-colored fur (tan-colored fur) to help them blend in with desert landscapes.

❸ القط البرى وثعلب الفنك :

- **الموطن :** الصحراء.
- **التكيف :** لديهم فراء ذهبى يمكنهم من التخفى فى الصحراء.

❹ Some desert lizards :

- **Habitat :** Desert.
- **Adaptation :** They have colorful scales that make them hide among the colorful rocks in the desert.

❹ بعض سحالى الصحراء :

- **الموطن :** الصحراء.
- **التكيف :** لديها حراشيف ملونة تمكنها من التخفى بين صخور الصحراء الملونة.

- Camouflage :

It is a type of adaptation that some animals use to hide from their predators or their preys by blending in with the surrounding environments.

- التخفى :

هى أحد صور التكيف لدى بعض الحيوانات والتى يستخدمها للتخفى من الحيوانات التى تريد افتراسه أو التخفى من فرائسه من خلال الاندماج مع البيئة المحيطة.

- Notes :

- Predator is an animal that hunts and eats another animal.
- Prey is an animal that is hunted and eaten by another animal.

- ملاحظات :

- الحيوان المفترس هو الحيوان الذى يقوم بإصطياد وأكل حيوان آخر.
- الفريسة هى الحيوان الذى يتم اصطياده وأكله من قبل حيوان آخر.

Activity 4 Pages 27 & 29

- **Structural adaptation :**

It is a change in the body structure of a living organism to help it survive.

- **Behavioral adaptation :**

It is a change in the behaviors or acts of a living organism to help it survive.

- **تكيف تركيبى :**

هو التغير فى تركيب جسم الكائن الحى ليساعده على البقاء حيًا.

- **تكيف سلوكى :**

هو التغير فى سلوكيات أو تصرفات الكائن الحى لتساعده على البقاء حيًا.

• Bull shark :

- **Habitat :**

Fresh water and salt water.

- **Structural adaptation :**
  - Its body is adapted to survive in fresh water, where no other sharks live in fresh water, so it has less competition to find food.
  - It uses a camouflage strategy called "countershading", where it has a dark back and white belly to sneak up on prey.
  - It has sharp teeth to cut its prey's flesh.

- **Behavioral adaptation :**
  - It eats different types of food as it lives in both fresh water and salt water.
  - It hunts during the day and at night, so it can surprise its prey.

- **قرش الثور :**

- **الموطن :**

الماء العذب والماء المالح

- **التكيف التركيبى :**
  - يتكيف جسمه للعيش فى الماء العذب حيث لا يوجد قروش أخرى تعيش فى الماء العذب وبالتالى تكون المنافسة أقل فى الحصول على الطعام
  - يمكنه استخدام استراتيجية تخفى تسمى «التباين اللونى» حيث إن لديه ظهر أسود وبطن أبيض مما يمكنه من الانقضاض على فرائسه.
  - لديه أسنان حادة تمكنه من تمزيق لحم فرائسه.

- **التكيف السلوكى :**
  - يمكنه تناول أنواع مختلفة من الطعام حيث أنه يعيش فى الماء العذب والماء المالح
  - يمكنه الاصطياد أثناء النهار وفى الليل وبالتالى فهو يفاجىء فرائسه.

Activity 5 Page 31

Adaptation of the panther chameleon to survive in its environment :

- **Structural adaptation :**
  - Chameleon has brightly colored scales to help it make camouflage and hide between green leaves and colorful flowers.
  - Chameleon eyes can face opposite directions, where each eye can move independently from the other, so one eye can search for food like insects, while the other eye looks out for danger in a different direction.
  - Chameleon has V-shaped feet and a tail like a hand to hold tightly the branches of trees.
- **Behavioral adaptation :**

  When chameleon finds itself in danger, it doesn't have teeth or claws for defense, but it has one last trick to scare its enemies (attackers), where it appears as fierce as follows :
  1. It puffs up its body with air.
  2. It opens its mouth wide.
  3. It changes the colors of its scales.

تكيف حرباء النمر للعيش فى بيئتها :

• **التكيف التركيبى :**

- لديها حراشيف زاهية الألوان لتمكنها من التخفى بين أوراق الأشجار الخضراء والأزهار الملونة.
- لديها عينان يمكنهما النظر فى اتجاهين مختلفين بحيث كل عين تتحرك منفردة، لذلك يمكن لأحد العينان أن تبحث عن الطعام مثل الحشرات، والعين الأخرى تراقب الخطر فى الاتجاه الآخر.
- لديها أقدام على شكل حرف «V» وذيل طويل وبالتالى يمكنها أن تمسك بفروع الأشجار بقوة.

• **التكيف السلوكى :**

حرباء النمر ليس لديها أسنان أو مخالب للدفاع عن نفسها، ولكن لديها حيلة لإخافة أعدائها عند الشعور بالخطر وظهورها بشكل شرس من خلال :

١- تنفخ جسمها بالهواء.

٢- تفتح فمها واسعًا.

٣- تغير لون حراشيفها.

Activity 6 Pages 41 & 42

Behavioral adaptation :

Acacia tree can defend itself as follows :

- It produces a poison when an animal begins eating its leaves to make the leaves taste very bad to keep this animal away.
- It sends a smelly message in the wind to warn other acacia trees nearby telling them to start making the same poison.

Behavioral adaptation :

- Kapok tree has delicious-smelling flowers to send messages through wind to attract bats towards it.
- Kapok tree has fluffy yellow seeds to be easily carried by wind across the forest.

التكيف السلوكى :

يمكن لشجرة السنط الدفاع عن نفسها كما يلى :

- عند اقتراب حيوان ما لأكل أوراقها، فأنها تفرز مادة سامة تجعل مذاق الأوراق سيئًا لإبعاد الحيوان.
- ترسل رسالة تحذيرية ذات رائحة تحملها الرياح لأشجار السنط الأخرى الموجودة حولها للبدء فى إنتاج نفس السم.

التكيف السلوكى :

- شجرة الكابوك لها أزهار ذات رائحة طيبة وذلك لكى ترسل رسائل تحملها الرياح لتجذب الخفافيش إليها.

- شجرة الكابوك لها بذور صفراء رقيقة وذلك لتحملها الرياح بسهولة عبر الغابة.

Activity 9 Pages 52 , 53 & 54

- **System :**
  It is a group of organs that work together to perform a specific job (function).
- **Digestion process :**
  It is a process of breaking down food into smaller parts that the body cells absorb and use them to get energy and growth.
- **Stomach :**
  - It is a muscular organ.
  - It mixes food with the stomach acid and digestive juices (enzymes) found in it to change the food into a soupy liquid.
  - Food stays in the stomach for few hours, then the muscles of the stomach move the food into a long, winding tube called small intestine.

- **الجهاز :**
  هو مجموعة من الأعضاء التى تعمل معًا لأداء وظيفة معينة.
- **عملية الهضم :**
  هى عملية تكسير الطعام لأجزاء صغيرة لتتمكن خلايا الجسم من امتصاصها واستخدامها للحصول على الطاقة والنمو.

- **المعدة :**
  - هى عضو عضلى.
  - تقوم بخلط الطعام بحمض المعدة والعصارات الهضمية (الأنزيمات) الموجودة بها لتحول الطعام إلى سائل.
  - يظل الطعام داخل المعدة لعدة ساعات، ثم تقوم عضلات المعدة بتحريك الطعام إلى أنبوب ملتف طويل يسمى بالأمعاء الدقيقة.

Activity 11 Pages 57 , 58 & 59

- **Respiration process :**
  It is a process of pulling air in (inhalation) and pushing air out (exhalation) of the body.
- **Trachea :**
  - It is a tube that allows air to pass into the "two lungs" which fill up with air like two balloons.
  - Inside the lungs, the trachea is branched into two tubes known as "two bronchi"
- **Two bronchi :**
  - They allow the air to enter the two lungs.
  - They are divided into smaller and smaller tubes that look like the branches of a tree known as "bronchioles".
- **Two lungs :**
  - Inside the lungs, the bronchioles end with little air sacs, surrounded by blood vessels known as "alveoli".
  - Inside the blood vessels, oxygen moves into the blood which carries oxygen around the body to help other organs and systems to work.

- **Diaphragm :**

It is a large muscle at the base of ribs which plays an important role in inhalation and exhalation.

- **عملية التنفس :**

هي عملية سحب الهواء (الشهيق) داخل الجسم ودفع الهواء خارجة (الزفير).

- **القصبة الهوائية :**

- هي أنبوبة تسمح بمرور الهواء إلى الرئتين اللتين تمتلئان بالهواء مثل البالون.
- تتفرع القصبة الهوائية داخل الرئة إلى فرعين هما الشعبتان الهوائيتان.

- **الشعبتان الهوائيتان :**

- يسمحان للهواء بالدخول إلى الرئتين.
- تنقسم الشعبتان الهوائيتان إلى أنابيب أصغر فأصغر تشبه أغصان الشجر تسمى بالشعيبات الهوائية.

- **الرئتان :**

- تنتهي الشعيبات الهوائية داخل الرئتان بأكياس هوائية صغيرة تسمى بالحويصلات الهوائية وهي تكون محاطة بالأوعية الدموية.
- داخل الأوعية الدموية، ينتقل الأكسجين إلى الدم الذي يحمله إلى كل أجزاء الجسم ليساعد الأعضاء والأجهزة على العمل.

- **الحجاب الحاجز :**

هو عضلة كبيرة تقع أسفل الضلوع وله دور مهم في عمليتي الشهيق والزفير.

Activity 12 Page 71

How do fish breathe under water ?

- Water enters the mouth of the fish and passes across the gills.
- Blood vessels inside the gills carry oxygen gas to the rest of the body and release carbon dioxide gas.

كيف يتنفس السمك تحت الماء ؟

- يدخل الماء إلى فم السمكة ويمر عبر الخياشيم
- تقوم الأوعية الدموية في الخياشيم بحمل غاز الأكسجين إلى باقي أجزاء الجسم وأيضا تتخلص من غاز ثاني أكسيد الكربون.

Activity 13 Pages 73 & 74

Types of environmental changes

- **Slow changes :**

These changes lead to :

Organisms will be able to adapt over time to survive.

- **Rapid changes :**

These changes lead to :

- Moving some organisms from one habitat to another, in which they can live and survive.
- Disappearance and death of some living organisms.
- Extinction of some living organisms.

أنواع التغيرات البيئية :

- **تغيرات بطيئة :**

وهذه التغيرات تؤدي إلى :

جعل الكائنات الحية قادرة على التكيف بمرور الوقت للبقاء حية

- **تغيرات سريعة :**

وهذه التغيرات تؤدي إلى :

- تحرك الكائنات الحية من موطن إلى موطن آخر حيث يمكنها العيش والبقاء حية
- اختفاء وموت بعض الكائنات الحية
- انقراض بعض الكائنات الحية

Human activities, such as :

1. Cutting down forests.
2. Farming and clearing lands.
3. Building communities instead of grasslands.
4. Introducing plants and animals into the environment that were never part of the ecosystem.
5. Air pollution that is caused due to the exhausts from cars and some factories.
6. Water pollution that is caused due to bad habits, such as throwing waste materials to waterways and soil.

أنشطة الإنسان مثل :

١- قطع الغابات.

٢- زراعة وتسوية الأرض.

٣- بناء المجتمعات بدلًا من الأراضي الزراعية.

٤- إدخال نباتات وحيوانات على البيئة لم تكن فى يوم من الأيام جزءًا من النظام البيئى.

٥- تلوث الهواء الذى ينتج عن عوادم السيارات والمصانع.

٦- تلوث الماء الذى ينتج عن بعض العادات السيئة مثل إلقاء المخلفات فى مجارى المياه والتربة.

Activity 15 Pages 83 & 84

• Careers and adaptation :

Through researches, scientists can learn how different organisms adapt to their environments and help endangered species survive.

• The role of scientists to protect many types of amphibians from extinction :

Scientists (biologists) are working to save many types of amphibians from extinction by studying :

- How amphibians breathe in air and water.
- Factors cause air and water pollutions that affect the life of amphibians.
- What make these animals sick in their environments.

• الوظائف والتكيف :

تمكن العلماء من معرفة كيفية تكيف الكائنات الحية فى بيئاتهم من خلال الأبحاث مما جعلهم قادرين على الإبقاء على الحيوانات المهددة بالانقراض على قيد الحياة.

• دور العلماء فى حماية العديد من البرمائيات من الانقراض :

يقوم علماء الأحياء بالحفاظ على العديد من البرمائيات من الانقراض وذلك من خلال دراسة :

- كيفية تنفس البرمائيات فى الهواء والماء.
- العوامل التى تسبب تلوث الهواء والماء واللذان يؤثران على حياة البرمائيات.
- ما يسبب أمراض لتلك الحيوانات فى بيئاتهم.

CONCEPT 1.2 Senses at Work

Activity 2 Page 100

1. Sound produced by dolphin travels in the form of waves called sound waves.
2. These waves travel through water and when they hit objects, they bounce back to the dolphin in the form of echo.
3. Echo helps the dolphin determine the location of prey and other objects.

١ الصوت الذى يصدره الدولفين ينتقل على صورة موجات تسمى موجات الصوت.

٢ تنتقل هذه الموجات فى الماء وعندما تصطدم بالأجسام فإنها ترتد مرة أخرى للدولفين على شكل صدى صوت.

٣ صدى الصوت يساعد الدولفين على تحديد مكان الفريسة والأجسام الأخرى.

Activity 5 Pages 105 & 106

1 Snakes :

Snakes have the ability to sense heat of their preys' bodies using a specialized body part in their faces.

2 Bats :

- Bats rely on echolocation like dolphins to find their food.
- The sound bounced back to bats help them to find their preys and move around.

3 Owls :

- Owls have both extraordinary sight and hearing.
- Bowl-shaped faces and specialized head feathers pick up and amplify distant sounds then direct these sounds into the owls' ears.
- Owls' large eyes allow them to detect tiny and faraway movements of their preys that hide in the grass or under the snow.
- Owls have the ability to turn their heads in all directions to search for preys everywhere.

١ الثعابين :

الثعابين لديها القدرة على الإحساس بحرارة أجسام فرائسها من خلال جزء خاص فى وجوهها.

٢ الخفافيش :

- تعتمد الخفافيش على تحديد الموقع بالصدى فى إيجاد طعامها مثلما تفعل الدلافين.
- الصوت الذى يرتد للخفافيش يساعدها فى إيجاد فرائسها التى تتحرك حولها.

٣ البوم :

- يمتلك البوم حاستى بصر وسمع فائقتين.
- وجوه البوم التى تشبه الوعاء وكذلك الريش الخاص الموجود فى رؤوسها يساعدها على تضخيم الأصوات البعيدة وتوجيهها إلى آذان البوم
- العيون الكبيرة للبوم تساعدها فى اكتشاف الحركات البسيطة لفرائسها البعيدة التى تختبئ فى الحشائش أو تحت الجليد
- البوم لديه القدرة على لف رؤوسها فى كل الاتجاهات للبحث عن فرائسها فى كل مكان.

Activity 6 Pages 107 & 108

❶ The brain :

- The brain is connected to a big nerve that runs through the backbone called the spinal cord.
- The brain is connected directly to some nerves such as the nerves of the eyes and the heart.

Its function :

It is the main control center in the body.

❷ The spinal cord :

The spinal cord is branched into smaller and smaller nerves.

Its function :

It helps carry messages to and from the body and the brain.

❸ Nerves :

Nerves are distributed throughout the body and connect the sense organs and the body parts with the brain.

Their function :

They carry messages from the brain to the spinal cord and other parts of the body, as well as from other parts of the body to the spinal cord and the brain.

Notes :

1. The nerves transmit information from the sensory organs to the brain in the form of electrical impulses.
2. The five sensory organs contain a special type of nerves known as sensory receptors.

Sensory receptors :

They are nerves found in different parts of the body that are responsible for receiving information from the environment.

❶ المخ :

- يتصل المخ بمجموعة من الأعصاب التى تمر عبر العمود الفقرى ويطلق عليها الحبل الشوكى.
- يتصل المخ ببعض الأعصاب بشكل مباشر مثل الأعصاب الخاصة بالعينين والقلب.

وظيفته :

هو مركز التحكم فى جسم الإنسان.

❷ الحبل الشوكى :

يتفرع الحبل الشوكى إلى أعصاب أصغر فأصغر.

وظيفته :

يقوم بحمل الرسائل من وإلى أجزاء الجسم والمخ أيضًا.

❸ الأعصاب :

- تنتشر الأعصاب عبر الجسم كله وهى تصل الأعضاء الحسية وأجزاء الجسم بالمخ.

وظيفتها :

تقوم بحمل الرسائل من المخ إلى الحبل الشوكى وباقى أجزاء الجسم، كما أنها تحمل الرسائل من باقى أجزاء الجسم إلى الحبل الشوكى والمخ.

ملاحظات :

١. تقوم الأعصاب بنقل المعلومات من الأعضاء الحسية إلى المخ فى صورة نبضات كهربية.
٢. تحتوى الأعضاء الحسية الخمس على نوع معين من الأعصاب تعرف بالمستقبلات الحسية.

المستقبلات الحسية :

هى مجموعة من الأعصاب الموجودة فى مختلف أجزاء الجسم وهى المسئولة عن استقبال المعلومات من البيئة المحيطة.

Activity 8 Pages 115 & 116

- Jerboa has large and sensitive ears, so it can detect even a quiet snake. (Structural adaption).
- Jerboa's feet and toes have hair to help it grip the sand when it hops and jumps.
- It hops in zigzag patterns, so it can escape quickly from danger. (Behavioral adaptation).
- Jerboa has long hind legs that enable it to jump a long distance. (Structural adaptation)

Reaction time :

It is the time taken by the body of a living organism to react to different information from the environment (such as danger).

- اليربوع يمتلك آذان كبيرة وحساسة والتى تمكنه من الكشف عن الحركات البطيئة للثعبان [تكيف تركيبى].
- يوجد على أقدام وأصابع اليربوع شعر يمكنه من الإمساك بالرمال عند القفز
- يقفز اليربوع فى مسارات متعرجة ليتمكن من الهروب من الخطر [تكيف وظيفى].
- يمتلك اليربوع أرجل خلفية طويلة تمكنه من القفز لمسافات طويلة [تكيف تركيبى].

زمن الاستجابة :

هو الزمن الذى يستغرقه جسم الكائن الحى فى الاستجابة للمعلومات المختلفة من البيئة المحيطة [مثل الخطر]

Concept 1.3 Light and Sight

Activity 2 Page 140

The fishing cat :

- It is a wild cat that hunts for food at night.
- The fishing cats eyes seem to glow in the dark because :
  - It has a mirror-like membrane on the back of its eyes.
  - When the light enters the fishing cat's eyes, it bounces off this membrane, allowing the eyes to collect more light.

القط السقّاك :

- هو قط برى يقوم بالصيد أثناء الليل للحصول على الغذاء
- عيون القط السقّاك تتوهج فى الظلام بسبب :
  - لديها غشاء فى مؤخرة أعينها يعمل كمرآة
  - عند دخول الضوء إلى أعين القط السقّاك فإنه يرتد مرة أخرى [ينعكس] عند سقوطه على هذا الغشاء مما يسمح لعين القط أن تجمع المزيد من الضوء

Activity 3 Pages 141 & 142

• A source of light :

It is something that gives off (emits) its own light.

Note :

There are other objects that don't emit their own light, but they reflect the light falling on them, so they are not considered as sources of light such as the Moon and a mirror.

• How we see :

When the source of light emits light rays that fall on objects, the light rays bounce off these objects to our eyes to see them.

• **Light :**

It is a visible form of energy that travels in the form of waves.

• **مصدر الضوء :**

هو أى شىء ينبعث منه (يشع) ضوءه الخاص.

ملحوظة :

هناك بعض الأجسام التى لا تشع ضوئها الخاص ولكنها تعكس الضوء الساقط عليها، وبالتالى فهى لا تعد مصادر للضوء مثل القمر والمرآة.

• **كيف نرى :**

عندما يصدر مصدر ضوئى أشعة ضوئية وتسقط على الأجسام، فإن هذه الأشعة الضوئية ترتد (تنعكس) من الأجسام إلى أعيننا فنرى تلك الأجسام.

• **الضوء :**

هو صورة مرئية من الطاقة والذى ينتقل على هيئة موجات.

Activity 4 Pages 147 & 148

Note :

Nocturnal animals can see in the weakest light levels but in complete darkness, they depend on other senses such as hearing, smell and touch that help them move in the dark and avoid predators.

1 Eyes :

- Tarsier has huge eyes like owl, to gather and reflect any light available to give them a picture of its surroundings.
- Tarsier can't move its big eyes in their sockets like owl.

2 Head :

Tarsier can turn its head 180 degrees like owl, to focus on distant or near objects at night since tarsier cannot move its big eyes in their sockets.

ملحوظة :

الحيوانات الليلية يمكنها أن ترى فى مستويات الضوء الضعيفة ولكن فى الظلام التام تعتمد على حواس أخرى مثل السمع، والشم، واللمس وجميعها تمكن الحيوانات الليلية من الحركة فى الظلام وتجنب الحيوانات المفترسة.

١ الأعين :

- يمتلك حيوان التارسير عيون كبيرة مثل البومة، وذلك لتجميع أى ضوء حولها ثم تعكسه لتوفير صورة واضحة عن بيئتها المحيطة.
- مثل البومة، لا يمكن لحيوان التارسير أن يحرك عيونه الكبيرة داخل تجويف العين.

٢ الرأس :

يمكن لحيوان التارسير أن يدير رأسه بزاوية ١٨٠ درجة مثل البومة، حتى يتمكن من التركيز على الأجسام القريبة والبعيدة فى الليل حيث أن التارسير لا يمكنه تحريك عيونه الكبيرة داخل تجويف العين.

Activity 7 Page 152

How tapetum lucidum works :

- When light enters the eyes of such animals and falls on the tapetum lucidum layer, it bounces off it like a mirror.
- The light that the eyes do not detect at first passes through to the tapetum lucidum and gets bounced back for second time that makes the eyes of such animals get more amount of light at nighttime.

كيف يعمل البساط الشفاف :

- عندما يدخل الضوء إلى أعين تلك الحيوانات ويسقط على غشاء البساط الشفاف فإن الضوء يرتد مثل ما يحدث للضوء مع المرآة.
- الضوء الذى لم تستطيع العين تحديده فى أول الأمر يسقط على غشاء البساط الشفاف ثم يرتد منه مرة ثانية مما يجعل عيون تلك الحيوانات تحصل على كمية أكبر من الضوء أثناء الليل.

Activity 9 Pages 158 & 159

- **Opaque objects :**
  - They are objects that don't allow light to pass through.
  - Things cann't be seen through them.
- **Transparent objects :**
  - They are objects that allow light to pass through.
  - Things can be seen through them.
- **Smooth Surface :**
  If the surface is smooth (such as a mirror), the light rays will reflect in one direction with the same angle at which they strike (hit) the object originally.
- **Rough Surface :**
  If the surface is rough (such as a painted surface), the light rays will scatter or diffuse in different directions.

- **الأجسام المعتمة :**
  - هى الأجسام التى لا تسمح بمرور الضوء من خلالها.
  - لا يمكن رؤية الأجسام من خلالها.
- **الأجسام الشفافة :**
  - هى الأجسام التى تسمح بمرور الضوء من خلالها.
  - يمكن رؤية الأجسام من خلالها.
- **السطح الناعم :**
  إذا كان السطح ناعمًا (مثل المرآة) فإن أشعة الضوء تنعكس فى اتجاه واحد بنفس الزاوية الأصلية التى سقطت بها أشعة الضوء على الجسم.
- **السطح الخشن :**
  إذا كان السطح خشنًا (مثل سطح مطلى بالدهان) فإن أشعة الضوء المنعكسة تتشتت وتنبعثر فى اتجاهات مختلفة.

Concept 1.4 Communication and Information Transfer

Activity 2 Page 174

How do fireflies use their senses to communicate ?

1. Fireflies use their wings to form different flash patterns to :
   - Warn off other fireflies from predators.
   - Attract a mate to reproduce.
2. They flash at regular periods of time, but if there is another group of fireflies flashing nearby, they will change their own flash pattern to match the flash pattern of the other group to communicate.

Note :

Humans use lights to communicate with each other to transfer information such as using traffic lights.

كيف تستخدم الخنافس المضيئة حواسها فى التواصل ؟

١- تستخدم الخنافس المضيئة أجنحتها لإطلاق ومضات ضوء فى نمط معين، وذلك :
- لتحذير باقى الخنافس المضيئة من وجود حيوانات مفترسة.
- لجذب الجنس الآخر من أجل التكاثر.

٢- تومض الخنافس المضيئة على فترات منتظمة، ولكن إذا كانت هناك مجموعة خنافس مضيئة أخرى تومض بالقرب منها فإنها سوف تغير نمط الإضاءة الذى تومض به وتقلد نمط المجموعة الأخرى لتتواصل معها.

ملحوظة :

البشر يستخدمون الضوء للتواصل ونقل المعلومات فيما بينهم مثل استخدام إشارات المرور.

Activity 5 Page 179

- **In winter :**
  - It is the mating season.
  - Their songs have high-pitched sounds which travel better through cold water. (High-pitched sounds such as the sharp voice of a woman).
- **In summer :**
  - It is the feeding season.
  - Their songs have low-pitched sounds which travel better through warm water. (Low-pitched sounds such as the rough voice of a man).

• **فى فصل الشتاء :**

- هو موسم التزاوج.

- تكون أغانى الحيتان ذات درجة عالية [حادة] وهى التى تنتقل بصورة أفضل فى الماء البارد [أصوات ذات درجة عالية مثل الصوت الحاد للمرأة].

• **فى فصل الصيف :**

- هو موسم التغذية.

- تكون أغانى الحيتان ذات درجة منخفضة [غليظة] وهى التى تنتقل بصورة أفضل فى الماء الدافىء [أصوات ذات درجة منخفضة مثل الصوت الغليظ للرجل].

Activity 6 Page 181

When sense organs receive this information and send messages to the brain, the brain decodes and interprets the meaning.

عندما تستقبل الأعضاء الحسية المعلومات وتقوم بإرسال رسائل إلى المخ، فإن المخ يقوم بفك تلك الشفرات ويفسر معناها.

Activity 7 Page 186

We can send encoding message to communicate with each other through different ways such as :

1. Using light energy that depends on the sense of sight.
2. Using sound energy that depends on the sense of hearing.

يمكن أن نقوم بإرسال رسائل مشفرة للتواصل فيما بيننا بعدة طرق مختلفة مثل :

١- استخدام الطاقة الضوئية التى تعتمد على حاسة البصر.

٢- استخدام الطاقة الصوتية التى تعتمد على حاسة السمع.

Activity 8 Page 189

1. In bees hive, they do special dances that represent a code to communicate with each other.
2. The scout bee (dancing bee) moves in a figure-eight pattern, while vibrating its wings.
3. The movements of this dance tell the other bees the correct direction and distance to food and water resources.
4. The other bees read the code of the dancing bee and then fly off to the specific location.

١ فى خلية النحل يقوم النحل بعمل رقصات خاصة تمثل شفرة معينة للتواصل فيما بينهم.

٢ تتحرك النحلة الكشافة [النحلة الراقصة] فى نمط على شكل رقم [8] مع اهتزاز جناحيها.

٣ هذه الحركات الراقصة تخبر باقى النحل عن الطريق والمسافة الصحيحة لمصادر الطعام والماء.

٤ يقوم باقى النحل بقراءة شفرة النحلة الراقصة، ثم تطير للمكان المحدد.

Activity 10 Page 191

Ants :

- Ants live in colonies that contain thousands of individuals.
- Groups of ants within a colony have different roles, where they have developed systems that help them divide their work among themselves, so there are nurse ants, scout ants and soldier ants.

النمل :

- يعيش النمل فى مستعمرات تتكون من آلاف الأفراد.
- تؤدى مجموعات النمل داخل المستعمرة أدوارًا مختلفة، حيث أنهم يقومون بإنشاء أنظمة تساعدهم على تقسيم العمل فيما بينهم، لذلك يوجد عاملات النمل، والنمل الكشاف، وجنود النمل.

Activity 12 Page 197

Note :

Humans cannot hear the high-pitched sounds produced either from bats or the special cane of blind people.

ملحوظة :

لا يستطيع البشر سماع الأصوات ذات الدرجات العالية [الحادة] مثل التى تصدر من الخفافيش أو العكاز الخاص بالأشخاص المكفوفين.

CONCEPT 2.1 Starting and Stopping

Activity 2 Page 210

How does this truck stop ?

To stop this truck, engineers turned to the idea that is used in the rocket designs, where they installed three parachutes that the driver opens to help slow down the truck quickly.

كيف يمكن إيقاف تلك الشاحنة ؟

لإيقاف تلك الشاحنة ذهب العلماء إلى فكرة تطبق فى تصميم الصاروخ، حيث قاموا بتركيب ثلاث مظلات والتى يقوم السائق بفتحها للمساعدة فى إبطاء الشاحنة بسرعة.

Activity 3 Page 213

Cart activity :

- Some engineers fix fire extinguishers onto a cart.
- When they release air from the fire extinguishers, the air moves backward that makes the cart begins to move forward.
- By increasing the number of fire extinguishers, the speed of the cart increases and the distance that it moves increases too and vice versa.

نشاط العربة :

- بعض المهندسين قاموا بتثبيت بعض طفايات الحريق على عربة صغيرة.
- عند خروج الهواء من طفايات الحريق فإنه يتحرك للخلف مما يجعل العربة الصغيرة تتحرك للأمام.
- كلما زاد عدد طفايات الحريق أزدادت سرعة العربة الصغيرة وأيضًا تزداد المسافة التى تقطعها والعكس صحيح.

Activity 4 Page 214

The relation between motion with balanced and unbalanced forces :

- If there are balanced forces act on an object, so this object will not move.
- If there are unbalanced forces act on an object, so this object will move.

العلاقة بين الحركة وكل من القوى المتزنة والغير متزنة :

- إذا أثرت قوى متزنة على جسم ما، فإن هذا الجسم لن يتحرك.
- إذا أثرت قوى غير متزنة على جسم ما، فإن هذا الجسم سيتحرك.

Activity 5 Pages 216 & 217

- **Motion :**

  It is any change in the position of an object relative to a fixed point.

- **Gravity :**

  It is the force that pulls objects down toward the Earth.

- Any object is in motion if the position of the object changes, even if this change cannot be seen.
- The change in position of an object is compared to something else that is not usually moving (fixed point).

- **الحركة :**

  هى أى تغير فى موضع الجسم بالنسبة إلى نقطة ثابتة.

- **الجاذبية :**

  هى القوة التى تسحب الأجسام لأسفل فى اتجاه الأرض.

- يكون الجسم فى حالة حركة إذا تغير موضع هذا الجسم حتى وإن كان هذا التغير فى الموضع غير مرئى.
- التغير فى موضع الجسم يقارن بشىء آخر ثابت عادة (نقطة ثابتة).

Activity 6 Page 222

Force :

It is a push or pull that is applied to an object causes it to change its position.

القوة :

هى الدفع أو السحب الذى يطبق على (يؤثر على) جسم مسببًا تغيير موضعه.

Activity 8 Page 224

- A moving object only stops when a force of the same amount is applied to it in the opposite direction of its motion.
- Sometimes it is easy to observe where the force that stops an object comes from, such as :

  A car crashes into a wall, it will stop because the wall applied a force to the car with the same amount of the force that pushes the car towards the wall.

- Sometimes it is hard to observe where the force that stops an object comes from, such as :

  A car runs out of fuel on a flat road, its speed decreases gradually until it stops, because there is a friction force comes from :

  1. Friction (rub) between the car tires and the road.
  2. Friction between the air that flows over the car against its surface.

- **Friction :**

  It is a force that is exerted when objects rub against each other.

Notes :

1. Friction force always slows down or stops motion of moving objects.
2. The direction of friction force is always opposite to the direction of motion of a moving object.

• يتوقف الجسم عن الحركة إذا أثرت عليه قوة بنفس المقدار فى عكس اتجاه حركته.

• فى بعض الأحيان يسهل ملاحظة القوة التى تسبب توقف حركة الجسم، مثل :
إذا اصطدمت سيارة بحائط، فإنها تتوقف بسبب أن الحائط يؤثر على السيارة بنفس مقدار القوة التى تدفع السيارة فى اتجاه الحائط.

• فى بعض الأحيان يصعب ملاحظة القوة التى تسبب توقف حركة الجسم، مثل :
إذا نفد الوقود من سيارة تسير على طريق مستو، فإن سرعتها تقل تدريجيًا حتى تتوقف، وذلك بسبب وجود قوة احتكاك تنتج من :
١. احتكاك إطارات السيارة بالطريق.
٢. احتكاك الهواء خارج السيارة باتجاه مضاد لسطحها.

• **الاحتكاك :**
هو القوة التى تنشأ عندما تحتك الأجسام ببعضها البعض.

ملاحظات :
١. قوة الاحتكاك دائمًا تبطأ أو تسبب توقف الأجسام المتحركة.
٢. دائمًا يكون اتجاه قوة الاحتكاك عكس اتجاه حركة الجسم المتحرك.

Activity 10 Page 230

Note :

If the same force acts on a toy car and a toy truck :

- The car (the small object) will travel a farther distance.
- The truck (the bigger object) will travel a shorter distance.

ملحوظة :
إذا أثرت قوة بنفس المقدار على سيارة لعبة وشاحنة لعبة، فإن :
• السيارة (الجسم الصغير) تتحرك لمسافة أبعد (أطول).
• الشاحنة (الجسم الأكبر) تتحرك لمسافة أقصر.

Activity 11 Page 233

- Force transfers energy from one object to another.
- The work done is equal to the amount of energy transferred by a force that is used to move an object.

Note :

Force and energy are different, but they are related to one another, where force is the effect that changes energy and turns it into work.

• القوة تنقل الطاقة من جسم إلى آخر.
• الشغل المبذول يساوى كمية الطاقة المنتقلة بواسطة القوة التى سببت حركة الجسم.

ملحوظة :
القوة والطاقة مختلفان، ولكنهما مرتبطان ببعضهما البعض، حيث إن القوة هى المؤثر الذى يغير الطاقة ويحولها إلى شغل.



Energy and Motion

Activity 2 Page 244

- The roller coaster moves up rapidly, then its speed decreases gradually until it reaches the highest point, then it pauses briefly at the top of the hill (ramp), then the speed of the train will increase as it moves down the hill.

1. As the roller coaster moves up the hill, there are electric motors that are used to carry the train cars up to the top of hill.
2. At the top of the hill, the train stores some energy (potential energy) during its rising.
3. As the roller coaster moves down the hill, the energy stored in the train (potential energy) changes into a more active form of energy (kinetic energy) that helps it move downward, so the train doesn't need electricity.

• يتحرك قطار الملاهي السريع لأعلى بسرعة، ثم تقل سرعته تدريجيًا حتى يصل لأعلى نقطة، ثم يتوقف لفترة وجيزة جدًا عند قمة المنحدر، ثم تبدأ سرعة القطار في التزايد وهو يهبط المنحدر.

١. عند صعود قطار الملاهي السريع لأعلى المنحدر، تقوم المحركات الكهربية به بحمل أو تحريك عربات القطار لقمة المنحدر.

٢. عند قمة المنحدر، يكون القطار قد قام بتخزين بعض من الطاقة [طاقة وضع] أثناء صعوده.

٣. عندما يقوم القطار بالهبوط لأسفل المنحدر، تتحول الطاقة المخزنة داخله [طاقة الوضع] إلى طاقة أكثر نشاطًا [طاقة حركة] والتي تساعده في الهبوط وبالتالي فلا يحتاج القطار إلى كهرباء.

Activity 4 Page 250

Note :

Any stopped object on the Earth's surface as in figure (1) has no energy, while any object at a height from the Earth's surface as in figure (2) has a special type of energy known as potential energy.

ملحوظة :

أي جسم متوقف على سطح الأرض مثل شكل [١] ليس لديه طاقة، بينما أي جسم موضوع على ارتفاع ما من سطح الأرض مثل شكل [٢] لديه نوع خاص من الطاقة يسمى طاقة الوضع.

Activity 5 Pages 251 & 252

- **Energy :** It is the ability to do work or cause change.
- **Work :** It is a force that causes an object to move a distance.

❶ Energy can be stored and changed from one form into another.
❸ We can see and measure what energy can do.

Example : When you push a wooden box and this box moves, this means that the energy transfers from you to the box and also can be measured through the distance that the box moves.

• **الطاقة :** هي القدرة على بذل شغل أو إحداث تغيير.

• **الشغل :** هو القوة التي تسبب حركة الجسم لمسافة معينة.

❶ الطاقة يمكن أن تخزن أو تتحول من صورة إلى أخرى.
❷ يمكننا أن نرى ونقيس ما تفعله الطاقة.

مثال : إذا قمت بدفع صندوق خشبي وتحرك هذا الصندوق فهذا يعني أن هناك طاقة قد انتقلت منك إلى الصندوق وكذلك يمكن قياس هذه الطاقة من خلال المسافة التي تحركها الصندوق.

Activity 6 Pages 253 & 254

- **Potential energy :**

It is the amount of energy that is stored in an object due to its position.

- **Kinetic energy :**

It is the energy of an object due to its motion.

Notes :

1. When an object has potential energy, so this object is ready to do work or to be active.
2. As the height of an object from the Earth's surface increases, potential energy stored inside this object increases.

- **طاقة الوضع :**

هى كمية الطاقة المخزنة فى جسم بسبب موضعه.

- **طاقة الحركة :**

هى طاقة الجسم بسبب حركته.

ملاحظات :

١- إذا كان هناك جسم لديه طاقة وضع، فهذا يعنى أن هذا الجسم جاهز لبذل شغل أو جاهز ليكون نشطًا.

٢- كلما زاد ارتفاع الجسم عن سطح الأرض، فإن طاقة الوضع المخزنة داخله تزداد.

Activity 7 Pages 259 & 260

Notes :

1. The chemical energy in the battery is not used until this battery is connected to a device.
2. When a spring is compressed, it stores potential energy inside it.

ملاحظات :

١- الطاقة الكيميائية فى البطارية لا يتم استخدامها إلا عند توصيل هذه البطارية بجهاز ما.

٢- عند ضغط زنبرك، فإنه يقوم بتخزين طاقة وضع بداخله.

Activity 8 Pages 262 & 263

- Energy is continuously changing and transforming from one form into another form.
- Energy is transferred from one place to another (such as when you kick a ball, energy moves from your leg to the ball).
- Energy can be stored in many different forms.
- New energy cannot be created and also existing energy cannot be destroyed.

Note :

The food you eat also stores chemical energy, where your digestive system breaks down the food you eat and changes it into energy stored in your body.

- الطاقة دائمة التغير والانتقال من صورة إلى أخرى.
- الطاقة تنتقل من مكان إلى آخر (مثلما يحدث عندما تركل كرة، فإن الطاقة تتحرك أو تنتقل من قدمك إلى الكرة).
- يمكن تخزين الطاقة فى عدة صور مختلفة.
- لا يمكن استحداث طاقة جديدة أو إفناء طاقة موجودة بالفعل.

ملحوظة :

الطعام الذى تأكله أيضًا يخزن طاقة كيميائية حيث يقوم جهازك الهضمى بتكسير الطعام الذى أكلته ويحوله إلى طاقة تخزن فى جسمك.

CONCEPT 2.3 Energy and Collisions

Activity 1 Page 281

A wrecking ball :

- It is a very heavy steel ball that swings on a cable.
- It is used to collide with walls of a building to help construction workers knock down walls or parts of buildings.

كرة الهدم :

- هى كرة ثقيلة جدًا من الفولاذ تتأرجح على كبل.
- تستخدم فى الاصطدام بجدران المبانى لتساعد عمال البناء فى تحطيم الجدران أو أجزاء من المبانى.

Activity 3 Page 283

❶ Seatbelts :

They are used in cars to keep the driver and also the passengers from moving forward when the car stops suddenly, so seatbelts have saved thousands of lives.

❷ Airbags :

Their structure :

Airbags are made up of thin nylon material folded into the steering wheel, seats, dashboard or doors.

Their importance :

- Airbags slow the speed of the driver's motion forward.
- Airbags absorb the energy of the car on collision.

❶ أحزمة الأمان :

تستخدم فى السيارات للحفاظ على السائق والركاب من التحرك إلى الأمام عندما تتوقف السيارة فجأة، لذلك فأحزمة الأمان أنقذت آلاف الأرواح.

❷ الوسائد الهوائية :

تركيبها :

تصنع الوسائد الهوائية من مادة النايلون الخفيف وتكون مطوية فى عجلة القيادة، أو المقاعد، أو لوحة التابلوه، أو الأبواب.

أهميتها :

- الوسائد الهوائية تقلل من سرعة حركة السائق للأمام.
- الوسائد الهوائية تمتص الطاقة الناتجة عن تصادم السيارة.

Activity 4 Page 289

Collision :

It is the moment where two objects hit or make contact in a forceful way.

التصادم :

هو اللحظة التى يصطدم فيها جسمان أو يلتحمان معًا بقوة.

Activity 5 Page 292

1. Measure the distance that both objects travel in the same amount of time.

The object that travels a greater distance in the same amount of time is moving at a greater speed.

2. Measure the time that both objects take to travel the same distance.

The object that travels the same distance in a smaller amount of time is moving at a greater speed.

١. قياس المسافة التى يقطعها الجسمان فى نفس الزمن.

الجسم الذى يقطع مسافة أكبر فى نفس الفترة الزمنية هو الجسم الذى لديه سرعة أكبر.

٢. قياس الزمن الذى يقطع فيه الجسمان نفس المسافة.

الجسم الذى يقطع نفس المسافة فى فترة زمنية أقل هو الجسم الذى لديه سرعة أكبر.

Activity 6 Page 293

- By increasing the speed of the object, the energy that transfers during collision will increase.
- Some of this transferred energy may be in the form of heat, light or sound.

• عند زيادة سرعة الجسم، فإن الطاقة التى تنتقل أثناء التصادم تزداد.

• بعض من هذه الطاقة المنتقلة يمكن أن تكون على صورة حرارة، أو ضوء، أو صوت.

Activity 7 Page 296

- As the speed of a moving object increases, its kinetic energy increases.
- Both speed and kinetic energy increase, as the angle of inclination increases.

• كلما زادت سرعة الجسم، زادت طاقة حركته.

• تزداد السرعة وطاقة الحركة كلما زادت زاوية الميل.

Activity 8 Page 302

- As the force on an object increases, its speed and the amount of its kinetic energy increase.
- As the kinetic energy of a moving object increases, more damage will happen to this object during collision.

• عند زيادة القوة المؤثرة على جسم، فإن سرعته تزداد وطاقته الحركية تزداد.

• كلما زادت طاقة الحركة لجسم متحرك، فإن مقدار التلف الذى سيحدث لهذا الجسم يزداد.

Activity 9 Page 303

The relation between the mass of objects and their kinetic energy :

- Different vehicles have different masses, where a large truck has a much greater mass than a car.
- If a large truck is traveling at the same speed of a car, the truck has more kinetic energy than the car, so the truck needs a bigger engine than the car.
- As the vehicle moves faster, the amount of fuel that burns inside its engine increases to provide it with more kinetic energy.
- As the mass of an object increases, its kinetic energy increases.

العلاقة بين كتلة الأجسام وطاقة حركتها :

• المركبات المختلفة لها كتل مختلفة، حيث إن كتلة شاحنة كبيرة يكون أكبر من سيارة.

• إذا تحركت شاحنة كبيرة بنفس سرعة السيارة، فإن الشاحنة يكون لديها طاقة حركة أكبر من السيارة وبالتالى تحتاج الشاحنة لمحرك أكبر من السيارة.

• كلما زادت سرعة المركبة، كلما زادت كمية الوقود التى تحترق داخل المحرك لتمد المركبة بطاقة حركة أكبر.

• كلما زادت كتلة الجسم، زادت طاقة حركته.

Activity 10 Pages 309 & 311

- The speed of the moving object on a ramp increases by increasing its mass.
- By increasing the mass of an object that moves down a ramp, the kinetic energy of this object increases.

• تزداد سرعة الجسم الذى يتحرك على منحدر، كلما زادت كتلة هذا الجسم.

• كلما زادت كتلة الجسم الذى يتحرك لأسفل على منحدر، كلما زادت طاقة حركته.

Activity 11 Page 317

Notes :

1. If you leave the moving balls of Newton's cradle long enough, their kinetic energy decreases gradually until they stop after lots of collisions.
2. Energy is conserved during collision, so it cannot be destroyed, but the amount of energy before the collision is equal to the amount of energy after the collision.

ملاحظات :

١. إذا تركت الكرات المتحركة فى بندول نيوتن لفترة طويلة كافية، فإن طاقة حركة الكرات تقل تدريجيًا حتى تتوقف بعد عدة تصادمات.

٢. الطاقة تظل محفوظة أثناء التصادم، لذلك لا يمكن تدميرها، ولكن كمية الطاقة قبل التصادم تساوى كمية الطاقة بعد التصادم.

